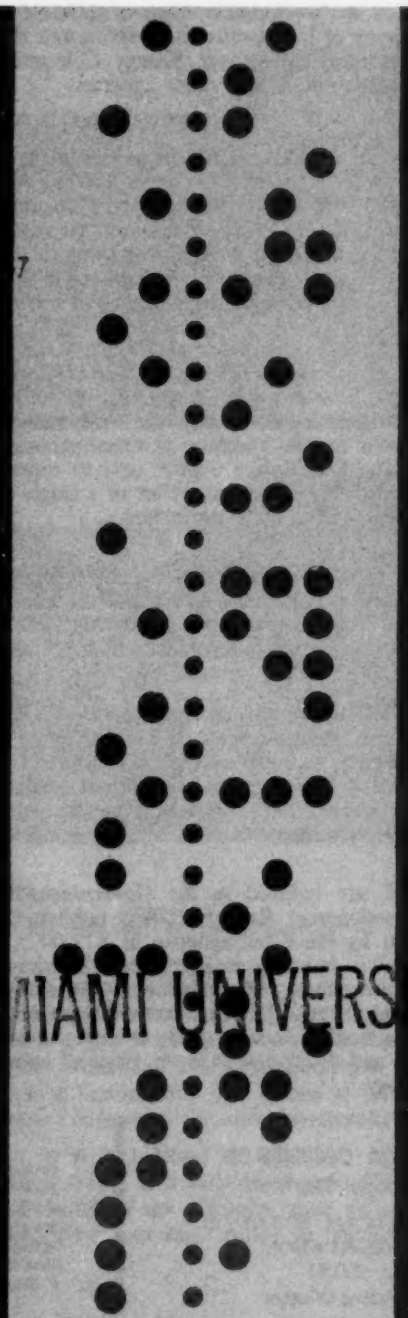
C 41.21: 67/22

November 25, 1967

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



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INDEX

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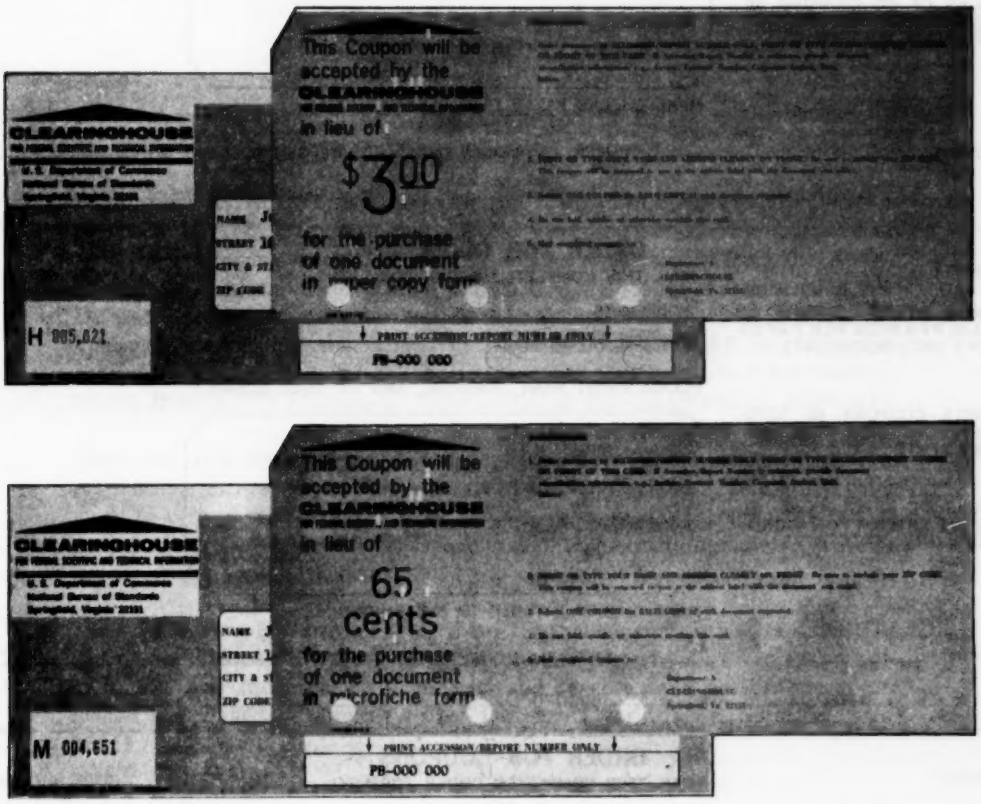

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There are some format errors and inconsistencies in this journal resulting from the machine merger of the data generated by several agencies. Efforts are being made to correct these inconsistencies. The agencies involved are working with a task group of the Committee on Scientific and Technical Information to develop improved interagency standards which will eliminate these problems.

The Clearinghouse is striving to improve the content and format of USGRDR so that it will become increasingly valuable to the general public as an announcement tool and order guide. Comments and suggestions for improvement are invited and should be directed to the Director, Clearinghouse, Springfield, Va. 22151.

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Reports are announced under 22 subject categories called FIELDS. Each FIELD is divided into subcategories called GROUPS. Documents are listed alphanumerically by accession number within the GROUP. This classification system was adopted by the Committee on Scientific and Technical Information (COSATI). The *COSATI Subject Category List* (AD 612 200) is available from the Clearinghouse at $3.00.

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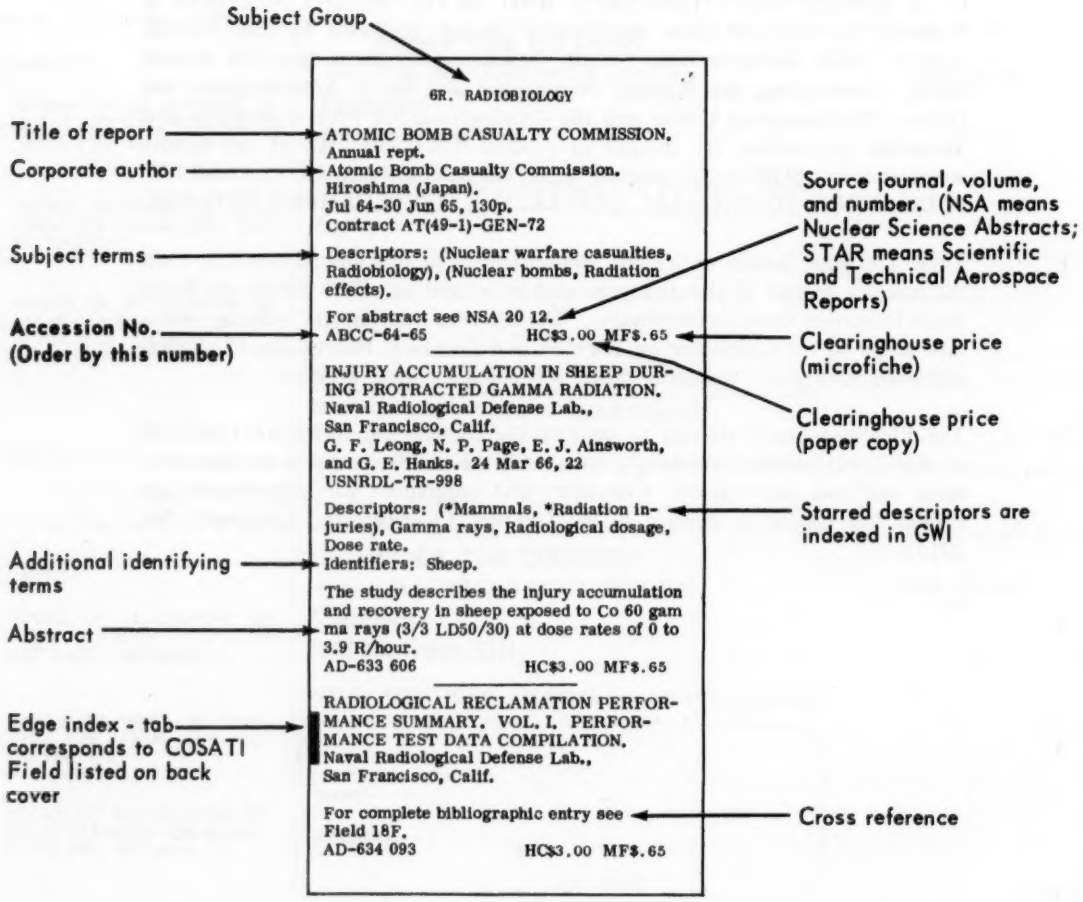
Subject Group
6R. RADIOBIOLOGY
Title of report
ATOMIC BOMB CASUALTY COMMISSION. Annual rept.
Corporate author
Atomic Bomb Casualty Commission. Hiroshima (Japan).
Jul 64-30 Jun 65, 130p.
Contract AT(49-1)-GEN-72
Subject terms
Descriptors: (Nuclear warfare casualties, Radiobiology), (Nuclear bombs, Radiation effects).
Source journal, volume, and number. (NSA means Nuclear Science Abstracts; STAR means Scientific and Technical Aerospace Reports)
For abstract see NSA 20 12.
Accession No. (Order by this number)
ABCC-64-65 HC$3.00 MF$.65
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INJURY ACCUMULATION IN SHEEP DURING PROTRACTED GAMMA RADIATION.
Naval Radiological Defense Lab., San Francisco, Calif.
G. F. Leong, N. P. Page, E. J. Ainsworth, and G. E. Hanks. 24 Mar 66, 22
USNRDL-TR-998
Descriptors: (*Mammals, *Radiation injuries), Gamma rays, Radiological dosage, Dose rate.
Starred descriptors are indexed in GWI
Additional identifying terms
Identifiers: Sheep.
Abstract
The study describes the injury accumulation and recovery in sheep exposed to Co 60 gamma rays (3/3 LD50/30) at dose rates of 0 to 3.9 R/hour.
AD-633 606 HC$3.00 MF$.65
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RADIOLOGICAL RECLAMATION PERFORMANCE SUMMARY. VOL. I. PERFORMANCE TEST DATA COMPILATION.
Naval Radiological Defense Lab., San Francisco, Calif.
For complete bibliographic entry see Field 18F.
Cross reference
AD-634 093 HC$3.00 MF$.65

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SUBJECT CATEGORY HEADINGS

Use Edge Index on back cover to locate COSATI Field in journal

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01 AERONAUTICS

Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.

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Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS

Includes astronomy; astrophysics; and celestial mechanics.

04 ATMOSPHERIC SCIENCES

Includes atmospheric physics and meteorology.

05 BEHAVIORAL AND SOCIAL SCIENCES

Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.

06 BIOLOGICAL AND MEDICAL SCIENCES

Includes biochemistry; bioengineering; biology; bionics; clinical medicine; environmental biology; escape, rescue, and survival; food; hygiene and sanitation; industrial (occupational) medicine; life support; medical and hospital equipment and supplies; microbiology; personnel selection and maintenance (medical); pharmacology; physiology; protective equipment; radiobiology; stress physiology; toxicology; and weapon effects.

07 CHEMISTRY

Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

08 EARTH SCIENCES AND OCEANOGRAPHY

Includes biological oceanography; cartography; dynamic oceanography; geochemistry; geodesy; geography; geology and mineralogy; hydrology and limnology; mining engineering; physical oceanography; seismology; snow, ice, and permafrost; soil mechanics; and terrestrial magnetism.

09 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes components; computers; electronic and electrical engineering; information theory; subsystems; and telemetry.

10 ENERGY CONVERSION (Non-Propulsive)

Includes conversion techniques; power sources; and energy storage.

COSATI FIELD

11 MATERIALS

Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.

12 MATHEMATICAL SCIENCES

Includes mathematics and statistics and operations research.

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

Includes air conditioning, heating, lighting, and ventilating; civil engineering; construction equipment, materials, and supplies; containers and packaging; couplings, fittings, fasteners, and joints; ground transportation equipment; hydraulic and pneumatic equipment; industrial processes; machinery and tools; marine engineering; pumps, filters, pipes, tubing, fittings, and valves; safety engineering; and structural engineering.

14 METHODS AND EQUIPMENT

Includes cost effectiveness; laboratories, test facilities, and test equipment; recording devices; reliability; and reprography.

15 MILITARY SCIENCES

Includes antisubmarine warfare; chemical, biological, and radiological warfare; defense; intelligence; logistics; nuclear warfare; and operations, strategy, and tactics.

16 MISSILE TECHNOLOGY

Includes missile launching and ground support; missile trajectories; missile warheads and fuzes; and missiles.

17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

Includes acoustic detection; communications; direction finding; electromagnetic and acoustic countermeasures; infrared and ultraviolet detection; magnetic detection; navigation and guidance; optical detection; radar detection; and seismic detection.

18 NUCLEAR SCIENCE AND TECHNOLOGY

Includes fusion devices (thermonuclear); isotopes; nuclear explosions; nuclear instrumentation; nuclear powerplants; radiation shielding and protection; radioactive wastes and fission products; radioactivity; reactor engineering and operation; reactor materials; reactor physics; reactors (power); reactors (non-power); and SNAP technology.

19 ORDNANCE

Includes ammunition, explosives; bombs; combat vehicles; explosions, ballistics, and armor; fire control and bombing systems; guns; rockets; and underwater ordnance.

20 PHYSICS

Includes acoustics; crystallography; electricity and magnetism; fluid mechanics; masers and lasers; optics; particle accelerators; particle physics; plasma physics; quantum theory; solid-mechanics; solid-state physics; thermodynamics and wave propagation.

21 PROPULSION AND FUELS

Includes air-breathing engines; combustion and ignition; electric propulsion; fuels; jet and gas turbine engines; nuclear propulsion; reciprocating engines; rocket motors and engines; and rocket propellants.

22 SPACE TECHNOLOGY

Includes astronautics; spacecraft; spacecraft trajectories and reentry; and spacecraft launch vehicles and ground support.

RESEARCH highlights

Reports of current high industrial interest

Highlighted documents, unless otherwise designated, are sold at the new unit price of $3.00 each, 65 cents microfiche.

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Transportation (Land, Sea, Air, Space)

A STUDY OF ADVANCED CONCEPTS FOR LATERAL AND PITCH FLIGHT PATH STABILIZATION OF LIGHT AIRCRAFT has recently been completed by workers at Honeywell Inc. A total of 14 lateral axis flight path control concepts suitable for fluid mechanization were evaluated with respect to their capacity to achieve specific predetermined primary and secondary design goals. The primary design goal was to achieve lateral flight path control which limits maximum flight path error to 1.3 miles 0.04 mi/mph of cross-course wind change in a 15-minute interval. The secondary design goal was to achieve a significant improvement over the flight path performance of the conventional attitude hold autopilot in the presence of a 20-mph change in crosswind velocity. The lateral flight path configurations studied were classified into the following groups: Single-Axis Concepts, Tight Roll Concepts, Biased Heading, Dual-Mode, and "Constant

Heading" Flight Path. Four pitch flight path control concepts were studied. The major emphasis was on a descent rate mode suitable for use during landing approach. It was concluded that two concepts (altitude rate feedback command and lagged pitch attitude feedback command) were equally suitable from a performance standpoint.

The report of the study contains criteria and procedures for evaluation of the flight test system, and a tabulation of the cost and weight breakdown of fluid mechanization and equivalent conventional hardware mechanization of the recommended configuration. It is estimated that the fluid system can be mechanized at one-half the cost and weight of the conventional system. ORDER. . . . . N67-36563 -- STUDY OF FLUID FLIGHT PATH CONTROL SYSTEM. . . . . Honeywell Inc., Minneapolis, Minn., for NASA, Aug. 67, 230p.

THE TRANSIM TRANSPORTATION SIMULATOR was developed at the University of California, Los Angeles, to fill the need for a general-purpose computer simulation method which is simple and economical to use for a wide variety of problems in transportation. TRANSIM's significant features are: (1) a standardized computer program and modular approach to the structuring of system models; (2) simulation of operations of complex transportation systems on a "one-to-one" basis, without mathematical abstractions; and (3) utilization of Monte Carlo sampling techniques where randomness influences are significant in total system performance.

TRANSIM was developed and improved through application to several real life problems, each deliberately selected to be different in scope, complexity, and mix of transportation modes. These initial applications are described in a report recently received at the Clearinghouse, they are: (1) Container Ship-Truck System, (2) Rail Classification Yard - Trailer-on-Flat-Car Operations, (3) Motor Carrier Urban Freight Operations, (4) Rail Unit Train Operations, (5) Great Lakes - St. Lawrence Seaway Pilotage and Shipping Systems, and (6) Marine Port-Complex. The purpose of the report is to provide examples of TRANSIM applications to assist users of the method in their simulation analyses of similar problem areas. ORDER. . . . . PB-176 158 -- CASE STUDIES OF TRANSIM ANALYSIS. . . . . A. M. Feiler, Dept. of Engineering, Univ. of Calif., Los Angeles, for Dept. of Commerce, May 67, 140p.

Control Systems and Instrumentation

A DESIGN MANUAL FOR CONTROL SYSTEMS USING ANALOG FLUIDIC DEVICES has recently been published by the Conrac Corporation of Malvern,

Pennsylvania. The graphical and equivalent circuit analytical methods on which the manual is based were developed and verified experimentally for wide classes of amplifiers and system components over a range of signal frequencies from zero to more than 400 cps. As a result, a unified analytical approach has been developed which in the future might be programmed for automatic design of complete control systems on a digital computer.

In addition to providing control engineers with analytical tools for system design, the manual contains a step-by-step design procedure illustrated with a practical sample problem, and reference information on definitions, symbols, and general principles. The manual also presents a universally acceptable vocabulary to aid communication among control engineer, fluidic device manufacturer, and the user's project engineer. ORDER. . . . . AD-659 415 -- FLUIDIC SYSTEM DESIGN MANUAL. . . . . C. A. Belsterling, Conrac Corp., Malvern, Pa., for the Army, July 67, 198p.

Human Factors Engineering

THE HUMAN OPERATOR'S MANUAL CONTROL SPEED, FREQUENCY, AND FLEXIBILITY is limited by his innate characteristics and by the state-of-the-art in manual-control technology. The bases of these limitations have been reviewed and analyzed in a report prepared by Dunlap and Associates, Inc., of Santa Monica, California; and recommendations for reducing these limitations have led to the development of a muscle action potential control, simultaneous visual-auditory display device.

In a discrete control situation, muscle action potential control was found to increase response speed by approximately 100 ms and simultaneous visual-auditory display was found to reduce response time by an additional 40 ms. In a continuous control situation, muscle action potential control via the facial muscles increased operator response bandwidth across a range of forcing function amplitudes. These results demonstrate the increase in response speed, frequency, and flexibility that accrues from use of muscle action potential control. The report also contains suggestions for further development of similar control devices. ORDER. . . . . NASA CR-874 -- HUMAN OPERATOR RESPONSE SPEED, FREQUENCY, AND FLEXIBILITY: A REVIEW, ANALYSIS AND DEVICE DEMONSTRATION. . . . . M. J. Wargo et al., Dunlap and Associates, Inc., Santa Monica, Calif., for NASA, Sept. 67, 82p.

Information Technology

A SIX-MONTH SURVEY OF ELECTRONIC DATA PROCESSING (EDP) ACTIVITIES IN SEVEN FEDERAL GOVERNMENT AGENCIES has been

published by Computing Technology, Inc., of Paramus, New Jersey. The seven agencies were selected because collectively they represent a fair cross-section of government EDP activity in terms of size of EDP operation, EDP applications, and machines and languages employed. The seven agencies were approached with the following five basic questions: (1) What is the agency's documentation policy and what are the documentation standards and procedures for implementing this policy? (2) Is there a documentation problem, and, if so, what is it and what is its probable cause? (3) How do programmers feel about the documentation policy, about the documents they use, and about their own role as documentors? (4) What kind of help, if any, could the agency use in the area of program-documentation guidelines? (5) What can be learned from the agency's experience which might be useful to the EDP community at large?

In addition to a detailed description of the EDP activity of each agency, the report presents an analysis of the answers to the questions posed and offers recommendations for handling existing problems. ORDER. . . . . PB-175 701 -- SURVEY OF COMPUTER-PROGRAM DOCUMENTATION PRACTICES AT SEVEN FEDERAL GOVERNMENT AGENCIES. . . . . B. E. Scott et al., Computing Technology Inc., Paramus, N. J., for National Bureau of Standards, Mar. 67, 118p.

Safety Engineering

RESULTS OF A CONCENTRATED RESEARCH EFFORT CONCERNING INTEGRATED SEAT/RESTRAINT SYSTEMS have been published in a four volume report by the Highway Safety Institute of the University of Michigan. This research has determined the present state of laws pertinent to the subject and defined the technological state-of-the-art relating to such systems.

The first volume of the report describes two models. Using techniques of the systems engineer, a mathematical model is developed which relates the occupant and his geometry to mechanical and spatial conditions of the vehicle seat and/or restraint system during a crash. Using similar techniques, a computer-oriented economics model is developed to measure the cost/benefit ratio for current and future seat and restraint systems. A methodology based on these models is proposed for setting and evaluating new Federal standards for integrated seat and restraint systems for both near- and long-term implementation.

The second, third, and four volumes describe in detail the relevant laws, the state of technology, and a mathematical simulation of a collision, respectively. ORDER:

PB-176 161 -- FINAL REPORT, INTEGRATED SEAT AND OCCUPANT RESTRAINT PERFORMANCE, VOLUME I, Univ. of Michigan, Ann Arbor, for U. S. Dept. of Transportation, Oct. 67, 36p.

PB-176 162 -- SURVEY OF PASSENGER RESTRAINT CODES, VOLUME II (Appendix A), R. Rose, 34p.

PB-176 163 -- BIBLIOGRAPHY OF INTEGRATED SEAT AND OCCUPANT RESTRAINT DESIGN, VOLUME III (Appendix B), 154p.

PB-176 164 -- MATHEMATICAL SIMULATION OF COLLISION, I, VOLUME IV (Appendix C), J. M. Becker and D. H. Robbins, 94p.

Testing, Analysis

A NUCLEAR-MAGNETIC-RESONANCE (NMR) SPECTROMETER has been designed and constructed for use in room-temperature studies of single crystals to determine the components of the electric-field-gradient (EFG) matrix, the asymmetry parameter, and the orientation of principal axes of the EFG matrix at nuclear sites. Advantages of this type of spectrometer over bridge and induction spectrometers rest in simplicity of design and ability to sweep the oscillator frequency over a wide range, a property which is especially convenient in cases where nuclear-quadrupole interaction may extend the nuclear-resonance spectrum over frequency intervals on the order of 2 or 3 Mc/s. There are two basic disadvantages to this type instrument. One is the difficulty of producing very small rf excitation fields which are sometimes necessary to avoid saturating the nuclear-magnetic-energy levels; the other arises from the nonuniform gain of the rf amplifier which makes comparisons of spectral intensities difficult and necessitates use of a calibrator.

The report describing the spectrometer's design and construction also contains selected recordings of the quadrupole splitting of Li^7 and Al^{27} nuclear resonance in a single crystal of spodumene and the B^{11} spectrum in a single crystal of kurnakuvite as an indication of spectrometer performance. A sequential procedure for properly adjusting the various controls is given along with a component block diagram and a complete set of circuit diagrams. ORDER. . . . . AD-659 778 -- A NUCLEAR-MAGNETIC-RESONANCE SPECTROMETER. . . . . R. E. Kvarda, U. S. Navy Electronics Lab., San Diego, Calif., June 67, 47p.

RESEARCH & DEVELOPMENT REPORTS

1. AERONAUTICS

1A. Aerodynamics

A REVIEW OF JET EFFLUX STUDIES APPLICABLE TO V/STOL AIRCRAFT,
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 1C.
AD-658 432 HC$3.00 MF$0.65

EFFECTS OF ROLL ON THE FREE-FLIGHT MOTION OF STATICALLY STABLE BODIES,
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 20D.
AD-658 433 HC$3.00 MF$0.65

LECTURES ON T9 5BULENT FLOW,
New York Univ N Y Dept of Aeronautics and Astronautics
For primary bibliographic entry see Field 20D.
AD-658 483 HC$3.00 MF$0.65

EXTERNAL FLOWS OF VISCOELASTIC MATERIALS: FLUID PROPERTY RESTRICTIONS ON THE USE OF VELOCITY-SENSITIVE PROBES.
Delaware Univ Newark Dept of Chemical Engineering
For primary bibliographic entry see Field 7A.
AD-658 523 Not available from CFSTI.

APPLICATION OF THE HYDRAULIC ANALOGY TO INTERNAL SUBSONIC FLOW,
Army Missile Command Redstone Arsenal Ala Army Inertial Guidance and Control Lab and Center
For primary bibliographic entry see Field 20D.
AD-658 669 HC$3.00 MF$0.65

FLUID PHYSICS OF HYPERSONIC WAKES, VOLUME I.
Advisory Group for Aerospace Research and Development Paris (France)
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FLUID PHYSICS OF HYPERSONIC WAKES, VOLUME II.
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For primary bibliographic entry see Field 20D.
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THE EFFECTS OF WATER VAPOR ON THE ELECTRON DENSITY OF SHOCK HEATED AIR,
Naval Ordnance Lab White Oak Md
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AD-658 719 HC$3.00 MF$0.65

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For primary bibliographic entry see Field 7D.
AD-658 782 HC$3.00 MF$0.65

MERGED LAYER IONIZATION IN THE STAGNATION REGION OF A BLUNT BODY.
Aerospace Corp San Bernardino Calif San Bernardino Operations
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AD-658 859 HC$3.00 MF$0.65

WIND TUNNEL TEST STUDY.
Collins Radio Co Cedar Rapids Iowa Aeronautical Research Lab
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WIND TUNNEL TEST STUDY.
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For primary bibliographic entry see Field 14B.
AD-658 996 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF HEAT EXCHANGE OF FLAT PLATE IN SUPERSONIC RAREFIED GAS FLOW,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20D.
AD-659 023 HC$3.00 MF$0.65

A PROCESS FOR MEASURING THE VELOCITY VARIATION OF SHOCK WAVES USING MICROWAVES.
Ein Verfahren Zur Messung des Geschwindigkeitsverlaufes Von Stosswellen Mit Hilfe Von Mikrowellen
Institut Franco-allemand de Recherches, St. Louis (France).
B. Koch, and M. Koenig. 13 Aug 65, 17p ISL-T-26/65
in German

Descriptors: *Microwave reflectometry, *Shock measuring apparatus, *Velocity measurement, Air, Apparatus, Behavior, Doppler effect, Front, Ionization, Measurement, Measuring, Microwave, Reflection, Reflectometer, Shock, Velocity.

For abstract, see STAR 05 21.
N67-35464 HC$3.00 MF$0.65

NUMERICAL RESULTS FOR THE DIFFRACTION OF A NORMAL SHOCK WAVE BY A SPHERE AND FOR THE SUBSEQUENT TRANSIENT FLOW.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 20D.
For abstract, see STAR 05 21.
N67-35723 HC$3.00 MF$0.65

HYPERSONIC AERODYNAMIC CHARACTERISTICS OF MINIMUM-WAVE-DRAG BODIES HAVING VARIATIONS IN CROSS-SECTIONAL SHAPE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
B. Spencer, Jr.. Sep 67, 26p NASA-TN-D-4079
Contract 126-13-03-20-23

Descriptors: *Aerodynamic characteristics, *Hypersonic speed, *Lifting body, *Wave drag, Aerodynamic, Body, Camber, Characteristics, Circular, Cross, Drag, Ellipsoid, Hypersonic, Lifting, Minimum, Performance, Pressure, Section, Shape, Speed, Variation, Wave.

For abstract, see STAR 05 21.
N67-35728 HC$3.00 MF$0.65

AERODYNAMIC INVESTIGATION OF SOME HIGH-DRAG ENTRY SHAPES AT MACH 15.4.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
F. W. Gibson. Sep 67, 27p NASA-TN-D-4134
Contract 124-08-05-10-23

Descriptors: *Aerodynamic characteristics, *Drag coefficient, *Reentry body, Aerodynamic, Angle of attack, Blunt, Body, Characteristics, Coefficient, Cone, Drag, Effect, Flow, Helium, Model, Nose, Radius, Reentry, Shape, Shell, Shoulder.

For abstract, see STAR 05 21.
N67-35730 HC$3.00 MF$0.65

SCALE FACTORS FOR PARACHUTE OPENING.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
R. L. Barton. Sep 67, 20p NASA-TN-D-4123
Contract 941-11-32-01-72

Descriptors: *Parachute, *Performance prediction, *Scale model, Drop, Earth, Equation, Force, Mach number, Method, Model, Motion, Opening, Performance, Prediction, Scale, Simulation, Test.

For abstract, see STAR 05 21.
N67-35778 HC$3.00 MF$0.65

STRUCTURAL RESPONSE TO INFLIGHT ACOUSTIC AND AERODYNAMIC ENVIRONMENTS.
Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 20K.
For abstract, see STAR 05 21.
N67-36060 HC$3.00 MF$0.65

AERODYNAMIC STUDY OF STAGNATION ABLATION.
Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.
K. Karashima, and H. Kubota. Jun 67, 35p ISAS-413, VOL. 32, NO. 6

Descriptors: *Ablating nose cone, *Aerodynamic heating, *Blunt body, *Hypersonic reentry, Ablation, Aerodynamic, Blunt, Body, Boundary, Cone, Equation, Flow, Heating, Hypersonic, Kinetic, Laminar, Layer, Nose, Reentry, Revolution, Stagnation, Temperature, Theory.

For abstract, see STAR 05 21.
N67-36099 HC$3.00 MF$0.65

REPORTS AND TRANSACTIONS, VOLUME XXXII.
Verslagen en Verhandelingen, Xxxii
Nationaal Lucht-en Ruimtevaartlaboratorium, Amsterdam (Netherlands). National Aerospace Lab.
1967, 114p

Descriptors: *Dynamic response, *Fatigue test, *Nozzle flow, *Pressure distribution, *Pressure measurement, Aerospace, Arbitrary, Cycle, Distribution, Dynamic, Fatigue, Flow, Ground-to-air, Laval number, Load, Measurement, Mode, Nozzle, Pressure, Random, Response, Skin, Tension, Test, Vibration, Wing.

For abstract, see STAR 05 21.
N67-36124 HC$3.00 MF$0.65

DETERMINATION OF STAGNATION TEMPERATURES IN THE R.A.R.D.E. HYPERSONIC GUN TUNNEL FROM STREAK CAMERA MEASUREMENTS OF FLOW VELOCITY.
Ministry of Technology, London (England). Aeronautical Research Council.
J. E. Bowman. 1967, 20p ARC-CP-929, RARDE-MEMO-2/66

Descriptors: *Flow velocity, *Gas gun, *Stagnation temperature, *Streak photography, Air, Camera, Combustion, Cooling, Flow, Gas, Gun, Hy-

personic, Measurement, Nylon, Piston, Rate, Stagnation, Temperature, Tunnel, Velocity.

For abstract, see STAR 05 21.
N67-36152 HC$3.00 MF$0.65

THE ACCURACY OF PRESSURE TRANSDUCERS WHEN USED IN SHORT-DURATION WIND-TUNNEL FACILITIES.
Ministry of Technology, London (England). Aeronautical Research Council.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 21.
N67-36153 HC$3.00 MF$0.65

THE UTILIZATION OF THE HOLOGRAPH IN THE AREA OF AERODYNAMICS.
Annendungen Der Holographie Auf Dem Gebiet Der Aerodynamik
Institut Franco-allemand de Recherches, St. Louis (France).
H. Royer, and P. Smigielski. 29 Sep 66, 15p ISL-T-26/66
By Direc. des Rech. Et Moyens D'essais in French Sponsored

Descriptors: *Gas flow, *Holography, *Interferometer, *Light scattering, *Photograph, Flow, Gas, Instrumentation, Light, Photography, Relief, Scattering.

For abstract, see STAR 05 21.
N67-36284 HC$3.00 MF$0.65

A NEAR-FIELD APPROACH TO THE SONIC BOOM PROBLEM.
Boeing Co., Renton, Wash. Commercial Airplane Div.
F. A. Woodward. Aug 67, 34p NASA-CR-73109, D6-15046
Contract NAS2-3719

Descriptors: *Aircraft configuration, *Far field, *Shock wave, *Sonic boom, *Supersonic pressure distribution, *Wing body, Aircraft, Analysis, Body, Boom, Calculation, Configuration, Distribution, Equation, Far, Feasibility, Field, Linear, Near, Pressure, Shock, Signature, Singularity (math), Sonic, Supersonic, Surface, Theory, Wave, Wing.

For abstract, see STAR 05 21.
N67-36403 HC$3.00 MF$0.65

SUPERSONIC FLOW PAST A FAMILY OF BLUNT AXISYMMETRIC BODIES.
Technical rept.,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
Milton D. Van Dyke, and Helen D. Gordon. 2 Oct 58, 28p NASA-TR-R-1
AD-229 406

Descriptors: (*Supersonic flow, *Blunt bodies), Axially symmetric flow, Bodies of revolution, Shock waves, Hypersonic flow, Spheres, Parabolic bodies, Equations of motion.

Some 100 numerical computations were carried out for unyawed bodies of revolution with detached bow waves. The gas is assumed perfect with gamma = 5/3, 7/5, or 1. Free-stream Mach numbers are taken as 1.2, 1.5, 2, 3, 4, 6, 10 and infinity. The results are summarized with emphasis on the sphere and paraboloid. (Author)
PB-175 821 HC$3.00 MF$0.65

TURBULENT BOUNDARY LAYER ON A YAWED CONE IN A SUPERSONIC STREAM.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Willis H. Braun. 24 Oct 59, 20p NASA-TR-R-7
AD-230 749

Descriptors: (*Turbulent boundary layer, Conical bodies), (*Supersonic flow, *Conical bodies), Yaw, Momentum, Integral equations, Prandtl number, Lift, Pitch (Motion), Friction.

The momentum integral equations are derived for the boundary layer on an arbitrary curved surface, using a streamline coordinate system. Computations of the turbulent boundary layer on a slightly yawed cone are made for a Prandtl number of 0.729, wall to free-stream temperature ratios of 1/2, 1, and 2, and Mach numbers from 1 to 4. Deflection of the fluid in the boundary layer from outer stream direction, local friction coefficient, displacement surface, lift coefficient, and pitching-moment coefficient are presented. (Author)
PB-175 826 HC$3.00 MF$0.65

SIMILARITY OF FAR NOISE FIELDS OF JETS.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 20A.
PB-175 853 HC$3.00 MF$0.65

APPROXIMATIONS FOR THE THERMODYNAMIC AND TRANSPORT PROPERTIES OF HIGH-TEMPERATURE AIR.
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 20M.
PB-175 855 HC$3.00 MF$0.65

STALL PROPAGATION IN A CASCADE OF AIRFOILS.
Technical rept.,
National Aeronautics and Space Administration, Washington, D. C.
Anthony R. Kriebel, Barry S. Seidel, and Richard G. Schwind. 1960, 54p NASA-TR-R-61
N62-70485
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.

Descriptors: (*Airfoils, *Stalling), Propagation, Cascade structures, Flow visualization, Flow fields, Gas turbine blades.

An experimental investigation of stall propagation in a stationary circular cascade in which high-speed schlieren and interferometer photography is used is described. The investigation suggests an analytical approach to the study of stall propagation which is valid only for an isolated blade row in an infinite flow field but which is not restricted to small unsteady perturbations or to an assumed simplified cascade geometry. Conditions necessary for the existence of the assumed type of stall cells are described and equations are derived for the velocity of stall-cell propagation. The propagation velocities predicted for the theoretical potential-flow model correlate with all the experimental values measured in an isolated rotor within 15 percent. Analysis of the flow model leads to the prediction of a tendency for the assumed type of stall cell to split with increasing incidence of the mean flow through the blade row. This tendency appears to correlate with the experimental observation of a trend for increasing numbers of cells in the rotor. (Author)
PB-175 862 HC$3.00 MF$0.65

A METHOD OF SOLUTION WITH TABULATED RESULTS FOR THE ATTACHED OBLIQUE SHOCK-WAVE SYSTEM FOR SURFACES AT VARIOUS ANGLES OF ATTACK, SWEEP, AND DIHEDRAL IN AN EQUILIBRIUM REAL GAS INCLUDING THE ATMOSPHERE.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Robert L. Trimpi, and Robert A. Jones. 1960, 144p NASA-TR-R-63
AD-232-843, N62-70487

Descriptors: (*Shock waves, *Leading edge), Angle of attack, Swept wings, Dihedral angle, Lifting reentry vehicles, Tables.

A new method of solution is derived from basic physical considerations. Results are tabulated for the following ranges: angle of attack, 0 degrees to 65 degrees; angle of sweep, 0 degrees to 75 degrees; angle of dihedral, 0 degrees to 30 degrees; Mach number, 3 to 30: and 'effective specific-heat ratio' parameter, 1.10 to 1.67. Both the method and tabulated solutions are easily adaptable to flight in any gas or in the atmosphere of any planet. An illustrative example is presented based on the 1956 ARDC model atmosphere. (Author)
PB-175 864 HC$3.00 MF$0.65

A STUDY OF THE SIMULATION OF FLOW WITH FREE-STREAM MACH NUMBER 1 IN A CHOKED WIND TUNNEL.
Technical rept.,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
John R. Spreiter, Donald W. Smith, and B. Jeanne Hyett. 1960, 39p NASA-TR-R-73
AD-236 897, N62-70497

Descriptors: (*Transonic flow, Simulation), (*Transonic wind tunnels, Damping), Two-dimensional flow, Axially symmetric flow, Interference.

The degree to which experimental results obtained under choking conditions in a wind tunnel with solid walls simulate those associated with an unbounded flow with free-stream Mach number 1 is investigated for the cases of two-dimensional and axisymmetric flows. It is found that a close resemblance does indeed exist in the vicinity of the body, and that the results obtained in this way are generally at least as accurate as those obtained in a transonic wind tunnel with partly open test section. Some of the results indicate, however, that substantial interference effects, particularly those of the wave reflection type, may be encountered under certain conditions, both in choked wind tunnels and in transonic wind tunnels, and that the reduction of these interference effects to acceptable limits may require the use of models of unusually small size. (Author)
PB-175 873 HC$3.00 MF$0.65

THE LATERAL RESPONSE OF AIRPLANES TO RANDOM ATMOSPHERIC TURBULENCE.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1C.
PB-175 874 HC$3.00 MF$0.65

FLOW IN THE BASE REGION OF AXISYMMETRIC AND TWO-DIMENSIONAL CONFIGURATIONS.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Milton A. Beheim. 1961, 35p NASA-TR-R-77
AD-241 609, N62-70501

Descriptors: (*Base flow, Pressure), (*Supersonic flow, Axially symmetric flow), Cylindrical bodies, Conical bodies, Two-dimensional flow, Aerodynamic configurations, Guided missiles.

A theoretical and experimental investigation was conducted of the pressure distribution on the surface of either a circular cylinder or a truncated cone located within the base region of another circular cylinder at Mach number 2. A similar analysis of pressure distribution was made for rearward-facing two-dimensional steps, and theoretical results were compared with experimental results of

earlier investigations. Effects of base bleed were also studied with the axisymmetric configurations. (Author)
PB-175 877 HC$3.00 MF$0.65

ALIGNMENT CHARTS FOR TRANSPORT PROPERTIES VISCOSITY, THERMAL CONDUCTIVITY, AND DIFFUSION COEFFICIENTS FOR NONPOLAR GASES AND GAS MIXTURES AT LOW DENSITY.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 7D.
PB-175 886 HC$3.00 MF$0.65

TURBULENT SKIN FRICTION AT HIGH MACH NUMBERS AND REYNOLDS NUMBERS IN AIR AND HELIUM.
Technical rept.,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
Fred W. Matting, Dean R. Chapman, Jack R. Nyholm, and Andrew G. Thomas. 20 Jun 60, 42p
NASA-TR-R-82
AD-243 704, N62-70506

Descriptors: (*Skin friction, Turbulence), (*Air, Skin friction), (*Helium, Skin friction), Mach number, Reynolds number, Turbulent boundary layer, Force (Mechanics).

Results are given of local skin-friction measurements in turbulent boundary layers over an equivalent air Mach number range from 0.2 to 9.9 and an over-all Reynolds number variation of 2,000,000 to 100,000,000. Direct force measurements were made by means of a floating element. Flows were two-dimensional over a smooth flat surface with essentially zero pressure gradient and with adiabatic conditions at the wall. Air and helium were used as working fluids. An equivalence parameter for comparing boundary layers in different working fluids is derived and the experimental verification of the parameter is demonstrated. Experimental results are compared with the results obtained by several methods of calculating skin friction in the turbulent boundary layer. (Author)
PB-175 887 HC$3.00 MF$0.65

1B. Aeronautics

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 9B.
AD-658 439 HC$3.00 MF$0.65

EVALUATION OF NOISE PROBLEMS ANTICIPATED WITH FUTURE VTOL AIRCRAFT.
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20A.
AD-658 448 HC$3.00 MF$0.65

COST/BENEFIT ANALYSIS OF TELEVISED RADAR FOR GENERAL AVIATION.
Final rept.,
Federal Aviation Administration Washington D C Systems Research and Development Service
Juel E. Erickson. Aug 67, 42p Rept no. FAA-RD-67-54

Descriptors: (*Radar navigation, Television communication systems), (*Aviation safety, Radar navigation), Airborne, Costs, Radar equipment, Feasibility studies, Airport radar systems, Meteorological radar, Air traffic control systems.

An economic evaluation of the costs and potential benefits of broadcasting radar information to general aviation aircraft via TV relay was performed. Benefits were equated to costs of general aviation accidents that might be prevented by broadcasting weather data, area route information or positions of other aircraft. Over 90 percent of general aviation accidents which might be prevented by the use of TV radar indicate weather as the primary benefit area. Therefore it was determined that the most promising area for improvement is in properly presenting weather data. It was determined that benefits of TV radar would exceed costs if at least 50 percent of all general aviation aircraft installed equipment and also that at least 50 percent of general aviation accident costs would be eliminated as a result. However, due to the probability of too few participating general aviation aircraft, the study concludes that no justification exists for pursuing the TV radar concept further at this time. Future improvements in radar, transmission capability, frequency availability and availability of suitable equipment for general aviation aircraft may indicate a need for further reassessment at that time. (Author)
AD-658 514 HC$3.00 MF$0.65

ECONOMIC ANALYSIS OF THE SHORT-HAUL TRANSPORT.
Systems Analysis and Research Corp Boston Mass
For primary bibliographic entry see Field 1C.
D-658 743 HC$3.00 MF$0.65

A NEW ASPECT OF MAN'S RELATIONS WITH BIRDS.
National Research Council of Canada, Ottawa (Ontario).
H. F. Lewis. 23 Nov 66, 6p CM4-S.17-2

Descriptors: *Aircraft hazard, Aircraft, Airport, Bird, Collision, Condition, Food, Hazard, Shelter, Water.

For abstract, see STAR 05 21.
N67-35617 HC$3.00 MF$0.65

DIVISION OF MECHANICAL ENGINEERING AND THE NATIONAL AERONAUTICAL ESTABLISHMENT QUARTERLY BULLETIN, 1 JAN. - 31 MAR. 1967.
National Research Council of Canada, Ottawa (Ontario).
31 Mar 67, 120p DME/NAE-1967/1

Descriptors: *Aerospace technology, *Lubricant, *Mechanical engineering, *Structural design, Aerospace, Aircraft detection, Controller, Design, Engineering, Fire control, Helicopter, Lubricating oil, Mechanical, Structural, Technology, Transport aircraft.

For abstract, see STAR 05 21.
N67-35995 HC$3.00 MF$0.65

THE APPLICATION OF NON-DIMENSIONAL METHODS TO THE PLANNING OF HELICOPTER PERFORMANCE FLIGHT TRIALS AND HE ANALYSIS OF RESULTS.
Ministry of Technology, London (England). Aeronautical Research Council.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 21.
N67-36154 HC$3.00 MF$0.65

1C. Aircraft

A REVIEW OF JET EFFLUX STUDIES APPLICABLE TO V/STOL AIRCRAFT,
Arnold Engineering Development Center Arnold Air Force Station Tenn
Jack E. Garner. Sep 67, 20p Rept no. AEDC-TR-67-163
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Exhaust gases, *Jets), (*Short take-off planes, Exhaust gases), State-of-the-art reviews, Vertical take-off planes, Flow fields, Subsonic flow, Thrust.

The state-of-the-art of jets exhausting into a subsonic crossflow is presented. These studies complement the current research effort in development of an analytical description of the flow field created by a V/STOL aircraft. (Author)
AD-658 432 HC$3.00 MF$0.65

EVALUATION OF NOISE PROBLEMS ANTICIPATED WITH FUTURE VTOL AIRCRAFT.
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20A.
AD-658 448 HC$3.00 MF$0.65

THE STATIC AERODYNAMIC CHARACTERISTICS OF A VARIABLE SWEEP WING RESEARCH MODEL.
David Taylor Model Basin Washington D C Aerodynamics Lab
For primary bibliographic entry see Field 20D.
AD-658 498 HC$3.00 MF$0.65

AUTOMATIC CONTROL SYSTEM SYNTHESIS TECHNIQUES. PHASE I. SURVEY OF FREQUENCY DOMAIN SYNTHESIS TECHNIQUES BASED ON THE ROOTS OF THE CHARACTERISTIC EQUATION.
Phase rept.,
Naval Air Development Center Johnsville Pa Aero Mechanics Dept
James C. Duke. 14 Sep 67, 33p Rept no. NADC-AM-6731

Descriptors: (*Flight control systems, Analysis), (*Control systems, Automatic), Linear systems, Feedback, Polynomials, Algorithms, Bibliographies, Mathematical analysis.

This report is a survey of analytical and graphical techniques which determine the values of the feedback parameters of a linear feedback system required to yield desired values of the dominant roots of the characteristic polynomial. Two types of systems were analyzed; single-input/single-output and multiple-input/multiple-output. The intent of this survey is to examine material which will be of interest in the development of a new synthesis technique which can be utilized to design automatic flight control systems. (Author)
AD-658 506 HC$3.00 MF$0.65

CONTROL OF FLEXIBLE AIRCRAFT DYNAMIC RESPONSE,
Advisory Group for Aerospace Research and Development Paris (France)
H. Max Davis, and Robert L. Swaim. 1966, 56p
NATO Furnished. Presented at the AGARD Specialists Meeting on Stability and Control, 20-23 September 1966, Cambridge, England.

Descriptors: (*Aircraft, Dynamics), (*Gust loads, Control systems), Aeroelasticity, Response, Flight testing, Fatigue (Mechanics), Stability, Design.

Local accelerations and airframe loading due to both rigid body and structural dynamics concern pilots and designers of aircraft. Gust response adversely effects system mission effectiveness by degrading structural fatigue life, crew and passenger comfort, handling qualities, and weapon delivery accuracy. Aircraft trends and developments that have precipitated this problem area are discussed. Various control system philosophies and techniques, both active and passive, that have been proposed and investigated as a means for controlling structural dynamic response are discussed. The use of suitably located, sized, and phased control force inputs can greatly increase the closed-loop damping ratios of the lower fre-

quency structural modes, alleviating the above problems. Such structural dynamic response control systems must be compatible with other subsystems such as terrain following and rigid body stability augmentation. (Author)
AD-658 524 HC$3.00 MF$0.65

THE REPORT OF THE AD HOC COMMITTEE ON VSTOL TERMINOLOGY.
Final rept.,
Air Force Flight Test Center Edwards AFB Calif
Robin K. Ransone, and Joseph G. Basquez. Jul 67, 17p Rept no. AFFTC-SP-67-1001

Descriptors: (*Vertical take-off planes, Vocabulary), (*Short take-off planes, Vocabulary), Helicopters, Standardization, Take-off, Aircraft landings, Flight.

The report is a standardized list of definitions associated with Vertical Short Takeoff and Landing aircraft. Contributions were made from among the several military services and aircraft companies. (Author)
AD-658 545 HC$3.00 MF$0.65

ECONOMIC ANALYSIS OF THE SHORT-HAUL TRANSPORT.
Systems Analysis and Research Corp Boston Mass
15 Mar 64, 115p
Contract FA-64-WA-4905

Descriptors: (*Transport planes, *Economics), Air transportation, Feasibility studies, Optimization, Air traffic, Costs, Aircraft seats, Performance (Engineering), Management planning.

The report presents the research methodology, findings and conclusions regarding the determination of the economically optimum seating capacity for an aircraft to be used by the domestic local service air carriers over their less dense routes during the 1970-1980 time period. The study also estimates the number of such aircraft which will be required. The basic input data for the study were one month's actual reported operation in complete detail as to schedules, passenger loads, aircraft utilization and all other significant operating considerations for each of the 13 local service carriers. Operational simulation techniques were employed to generate and evaluate alternative solutions. Although there was found to be a variation of from 16 to 30 seats in capacity from carrier to carrier, the study indicates that a 20-seat aircraft will provide optimum economic operating results on an industry-wide basis. The study estimates that by 1975 the local service industry could economically justify approximately 300 to 500 units depending on variations in assumed aircraft hourly utilization, equipment mix, reasonably attainable system load factor and block speed. (Author)
AD-658 743 HC$3.00 MF$0.65

INTEGRATED COCKPIT RESEARCH PROGRAM. APPENDIX I.
Final rept.,
Litton Systems Inc Woodland Hills Calif Guidance and Control Systems Div
John V. Murphy, Donald J. Pizzicara, James J. Belcher, Robert L. Hamson, and Raymond E. Bernberg. Jan 67, 249p
Contract Nonr-4951 (00)
See also AD-658 754.

Descriptors: (*Cockpits, Systems engineering), Cost effectiveness, Human engineering, Display systems, Pilots, Performance (Human), Control, Analysis, Man-machine systems.

The Integrated Cockpit Research Program was designed to develop a methodology for avionic system design application to aircraft in an advanced time period. Emphasis was placed on two major activities. One was concerned with identifying the requirements for the operator/avionic system in the future time period, and a second activity was concerned with identifying the technological state-of-the-art that would be available in the advanced time period to meet those requirements. Successive aspects of the study were concerned with synthesizing an avionic system, completing a cost effectiveness evaluation, and the preparation of a cockpit mockup. Appendix I contains the function flow diagrams and the matrix analyses for all three missions. (Author)
AD-658 753 HC$3.00 MF$0.65

INTEGRATED COCKPIT RESEARCH PROGRAM. APPENDIX II.
Final rept.,
Litton Systems Inc Woodland Hills Calif Guidance and Control Systems Div
John V. Murphy, Donald J. Pizzicara, James J. Belcher, Robert L. Hamson, and Raymond E. Bernbery. Jan 67, 93p
Contract Nonr-4951 (00)
See also AD-658 753.

Descriptors: (*Cockpits, Systems engineering), Cost effectiveness, Human engineering, Display systems, Pilots, Automatic, Data processing systems, Control, Specifications.

The Integrated Cockpit Research Program was designed to develop a methodology for avionic system design application to aircraft in an advanced time period. Emphasis was placed on two major activities. One was concerned with identifying the requirements for the operator/avionic system in the future time period, and a second activity was concerned with identifying the technological state-of-the-art that would be available in the advanced time period to meet those requirements. Successive aspects of the study were concerned with synthesizing an avionic system, completing a cost effectiveness evaluation, and the preparation of a cockpit mockup. Appendix II contains the data processing analysis with block diagrams of the major functional areas. (Author)
AD-658 754 HC$3.00 MF$0.65

STRESSES IN SKIN PANELS SUBJECTED TO RANDOM ACOUSTIC LOADING.
Technical rept.,
Southampton Univ (England) Inst of Sound and Vibration Research
Brian L. Clarkson. Jun 67, 60p
AFML-TR-67-199
Contract AF 61 (052)-627

Descriptors: (*Airplane panels, Stresses), Great Britain, Loading (Mechanics), Jet plane noise, Experimental data, Control surfaces, Fatigue (Mechanics).

The report summarises the fully documented experimental data which is available on the stresses induced in typical aircraft structure by jet noise at take off. The experimental values are compared with a design procedure based on a single degree of freedom analysis and the method is extended for application to control surfaces and to integrally stiffened skin panels. The estimates are generally within a factor of two of the measured values. The relatively new phenomenon of shock cell noise is introduced and a typical result for the variation of r.m.s. stress during take off and climb is discussed. (Author)
AD-658 846 Not available from CFSTI.

FLIGHT TEST OF A 30-FOOT NOMINAL DIAMETER DISK-GAP-BAND PARACHUTE DEPLOYED AT A MACH NUMBER OF 1.56 AND A DYNAMIC PRESSURE OF 11.4 POUNDS PER SQUARE FOOT.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
C. V. Eckstrom, and J. S. Preisser. Sep 67, 37p
NASA-TM-X-1451
Contract 709-08-00-01-23

Descriptors: *Flight test, *Parachute, *Planetary entry, *Supersonic speed, Band, Canopy, Deployment, Disk, Drag, Dynamic, Entry, Flight, Gap, Inflation, Instrumentation, Low, Payload, Pitch, Planetary, Pressure, Speed, Supersonic, Test, Yaw.

For abstract, see STAR 05 21.
N67-35616 HC$3.00 MF$0.65

SUPERSONIC TRANSPORT AIRPORT AND COMMUNITY JET NOISE DURING TAKEOFF AND INITIAL CLIMB.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. W. Koenig, G. A. Kraft, and J. B. Whitlow, Jr.. Sep 67, 22p NASA-TM-X-1452
Contract 126-15-02-02-22

Descriptors: *Engine design, *Flight characteristics, *Jet noise, *Supersonic commercial air transport (scat), Afterburning, Airport, Burn, Characteristics, Community, Design, Duct, Engine, Fixed, Flight, Jet, Measurement, Noise, Operation, Size, Takeoff, Turbofan, Turbojet, Wing.

For abstract, see STAR 05 21.
N67-35721 HC$3.00 MF$0.65

A SUMMARY OF OPERATIONAL EXPERIENCES OF THREE LIGHT OBSERVATION HELICOPTERS AND TWO LARGE LOAD-LIFTING MILITARY HELICOPTERS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
D. J. Di Carlo. Sep 67, 36p NASA-TN-D-4120
Contract 721-02-00-07-23

Descriptors: *Military helicopter, *Performance characteristics, Acceleration, Aerodynamics, Cargo, Characteristics, Climb, Descent, Flight, Helicopter, Lift, Military, Operation, Performance, Speed, Surveillance, Time.

For abstract, see STAR 05 21.
N67-35733 HC$3.00 MF$0.65

THE APPLICATION OF NON-DIMENSIONAL METHODS TO THE PLANNING OF HELICOPTER PERFORMANCE FLIGHT TRIALS AND THE ANALYSIS OF RESULTS.
Ministry of Technology, London (England). Aeronautical Research Council.
P. A. Knowles. 1967, 60p ARC-CP-927, AAEE/TECH/322/PERF

Descriptors: *Flight test, *Helicopter performance, Altitude, Autorotation, Climb, Engine, Flight, Helicopter, Hovering, Method, Nondimensional, Performance, Test, Turbine, Vertical.

For abstract, see STAR 05 21.
N67-36154 HC$3.00 MF$0.65

CALCULATION OF AERODYNAMIC LOADING AND TWIST CHARACTERISTICS OF A FLEXIBLE WING AT MACH NUMBERS APPROACHING 1.0 AND COMPARISON WITH EXPERIMENT.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
John P. Mugler, Jr. 1960, 20p NASA-TR-R-58
AD-230 988, 62-70482

Descriptors: (*Wings, Aeroelasticity), (*Aerodynamic loading, Wings), (*Twist (Aerodynamics), Wings), Flexible structures, Mach number, Subsonic characteristics, Transonic characteristics, Iterative methods, Swept wings.

An iteration method is presented by which the detailed aerodynamic loading and twist characteristics of a flexible wing with known elastic properties may be calculated. The method is applicable at Mach numbers approaching 1.0 as well as a subsonic Mach numbers. Calculations were made for a wing-body combination; the wing was swept back 45 degrees and had an aspect ratio of 4. Comparisons were made with experimental results at Mach numbers from 0.80 to 0.98. (Author)
PB-175 849 HC$3.00 MF$0.65

STATUS OF SPIN RESEARCH FOR RECENT AIRPLANE DESIGNS.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Anshal L. Neihouse, Walter J. Klinar, and Stanley H. Scher. 1960, 58p NASA-TR-R-57
N62-70481

Descriptors: (*Airplanes, Design), (*Spin, Airplanes), Reviews, Control systems, Effectiveness, Canard configuration.

The study is presented in terms of the following major problem areas: interpretation of results of spin-model research, analytical spin studies, techniques involved in obtaining measurements of various parameters in the spin, effectiveness of controls during spins and recoveries, influence of long noses, strakes, and canards on spin and recovery characteristics, and correlation of spin and recovery characteristics for recent airplane and model designs. (Author)
PB-175 850 HC$3.00 MF$0.65

THE LATERAL RESPONSE OF AIRPLANES TO RANDOM ATMOSPHERIC TURBULENCE.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
John M. Eggleston, and William H. Phillips. 1960, 62p NASA-TR-R-74
N62-70498

Descriptors: (*Airplanes, *Gust loads), (*Atmospheric motion, Aeronautics), Roll, Turbulence, Flight, Yaw, Gusts.

In part I the power spectra of the lateral motions of an airplane flying through continuous random isotropic turbulence are derived. Random variations of gust velocities across the span and along the fuselage are considered. In part II a simplified method is presented in which the gust velocities are represented as rolling gusts, yawing gusts, and side gusts. A sample calculation procedure is presented for obtaining the response of the airplane in each degree of freedon. (Author)
PB-175 874 HC$3.00 MF$0.65

TEMPERATURE CONTROL OF BALLOON PACKAGES.
National Center for Atmospheric Research, Boulder, Colo.
For primary bibliographic entry see Field 4A.
PB-176 089 HC$3.00 MF$0.65

1D. Aircraft Flight Control and Instrumentation

EVALUATION OF A MULTIPLE FM/CW RADIO ALTIMETER INSTALLATION.
Final rept.,
National Aviation Facilities Experimental Center Atlantic City N J
Richard W. Cleary. Apr 67, 20p
FAA-RD-67-21

Descriptors: (*Radio altimeters, Multiple operation), Accuracy, Interference, Airborne, Height finding, Frequency modulation, Automatic, Terrain, Landings, Errors, Failure (Electronics).

Interference effects in multiple radio altimeter installations were investigated. Three FM/CW radio altimeters in one aircraft were operated simultaneously over various types of terrain. Mutual interference between altimeters was not significant under normal operating conditions. Differences of indicated altitude occurred between altimeters over irregular terrain. The differences were pronounced when the antenna patterns of the altimeters were skewed with respect to one another. The differences were not significant when the antenna patterns were approximately coincident. It was recommended that multiple antenna installations be designed to provide nearly coincident beam axes. (Author)
AD-658 729 HC$3.00 MF$0.65

STUDY OF FLUID FLIGHT PATH CONTROL SYSTEM.
Honeywell, Inc., Minneapolis, Minn.
Aug 67, 229p NASA-CR-758, REPT.-20175-FR1
Contract NAS4-763

Descriptors: *Aircraft stability, *Control system, *Flight path, *Fluid mechanics, Acceptance, Aircraft, Control, Flight, Fluid, Input, Lateral, Light, Mechanics, Path, Pilot, Pitch, Ramp, Stability, Step, System, Wind.

For abstract, see STAR 05 21.
N67-36563 HC$3.00 MF$0.65

SEVERAL METHODS FOR AERODYNAMIC REDUCTION OF STATIC-PRESSURE SENSING ERRORS FOR AIRCRAFT AT SUBSONIC, NEAR-SONIC, AND LOW SUPERSONIC SPEEDS.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Virgil S. Ritchie. 25 Feb 59, 26p NASA-TR-R-18
AD-219 885, N62-70442

Descriptors: (*Altimeters, Errors), (*Transonic flight, Altimeters), Aerodynamic configurations, Aircraft, Reduction, Statics, Pressure, Subsonic flow, Supersonic flight.

Tests were conducted in transonic wind tunnels to investigate and verify experimentally methods for aerodynamically reducing errors due to sensor position, bow-wave passage, and angle of attack. The results indicated that aerodynamic devices of simple design may be employed to reduce errors in sensing static pressures to less than 0.5 percent at Mach numbers from about 0.40 to 1.15. (Author)
PB-175 883 HC$3.00 MF$0.65

1E. Air Facilities

AN ANALYSIS OF RUNWAY VISUAL RANGE.
Final rept.,
Weather Bureau Atlantic City N J Test and Evaluation Lab
Matthew Lefkowitz, and Ernest E. Schlatter. Dec 66, 138p
FAA-RD-66-100

Descriptors: (*Runways, *Visibility), Marker lights, Ranges (Distance), Illumination, Thresholds (Physiology), Vision, Human engineering, Meteorological parameters, Standards.
Identifiers: Runway visual range.

The results of a controlled observational program were used to validate the credibility of the current runway visual range system, and to provide a basis whereby future visual range systems and lighting methods can be compared. It was found that the current runway visual range system concept is generally credible although certain areas were noted to be considered for modification. Runway visual range for day is conservative in that most static observers could see farther than the current system predicts. The static observer's visual range of runway lights by day does not conform to Allard's Law when the visual illuminance threshold value is fixed. Night runway visual range, as predicted by the current system, approximates the average visual range of the static observations and generally conforms to Allard's Law. The fact was established that runway visual range represents a probability of sighting light targets, and as such should be recognized by the user as not being an exact absolute value. A benchmark system is proposed whereby other visual range systems and lighting techniques can be compared.
AD-658 537 HC$3.00 MF$0.65

RADIOACTIVE TAXI GUIDANCE TEST CATEGORY III GROUND GUIDANCE EQUIPMENT.
National Aviation Facilities Experimental Center Atlantic City N J
For primary bibliographic entry see Field 17G.
AD-658 742 HC$3.00 MF$0.65

2. AGRICULTURE

2A. Agricultural Chemistry

CBE FACTORS: MONTHLY SURVEY NO. 17.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-658 438 HC$3.00 MF$0.65

2B. Agricultural Economics

CONSUMPTION COOPERATION IN RURAL AREAS IN THE USSR: A COMMENT.
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5C.
AD-658 425 HC$3.00 MF$0.65

2D. Agronomy and Horticulture

A METHOD FOR DERIVING PREDICTIONS OF SOIL TEMPERATURE FROM MEDIUM-RANGE WEATHER FORECASTS.
Weather Bureau, Silver Spring, Md. Weather Analysis and Prediction Div.
For primary bibliographic entry see Field 8M.
PB-175 773 HC$3.00 MF$0.65

CLIMATOLOGICAL ASPECTS OF THE VIRGIN SOIL PROJECT IN THE U. S. S. R.,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 045 HC$3.00 MF$0.65

2F. Forestry

TERMITES OF AUSTRALIAN FOREST TREES.
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Entomology.
1967, 43p Technical paper-7
For descriptive text on each study, see PB-175 901 thru PB-175 903.

Descriptors: (*Forestry, Australia), (*Isoptera, *Trees), Entomology, Damage, Wood, Degradation, Volume, Costs.

The report contains comparisons made between the attack by Coptotermes spp. in coastal forests

and that by the Alpine termite (Porotermes adamsoni (Froggatt)). (Author)
PB-175 900 HC$3.00 MF$0.65

TIMBER LOSSES CAUSED BY TERMITES, DECAY, AND FIRE IN TWO COASTAL FORESTS IN NEW SOUTH WALES,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Entomology.
T. Greaves, G. J. Armstrong, R. S. McInnes, and J. E. Dowse. 18 Oct 66, 15p Technical Paper-7
This report consists of pages 4-18. Order as PB-175 900.

Descriptors: (*Forestry, Australia), (*Trees, Damage), (*Isoptera, Trees), Wood, Degradation, Volume, Costs, Fires, Entomology, Maps.

Methods of assessing damage by termites (Coptotermes acinaciformis (Froggatt) and C. frenchi Hill) are described. Details are given of losses assessed in over 3000 logs from a virgin forest (mostly overmature blackbutt (Eucalyptus pilularis Smith)) estimated to be up to 300 years old, and in 1600 logs from trees in a younger forest managed for sustained yield. Causes of loss in the assessed trees were: in the virgin forest, termites, 92%; decay and defective shape, 6%; fire, 2%; in the less mature forest, termites, 64%; decay and defective shape, 33%; fire, 3%. Combined losses in six compartments totalling 246 acres of virgin forest were half the potential timber volume available. The volume of timber sold was 7700 super ft Hoppus per acre; the defect volume lost in logs was 2750 super ft net Hoppus per acre; plus 4900 super ft Hoppus contained in trees regarded as unmerchantable because of excessive defect. Revenue from felled trees averaged $62.40 per acre, but royalty loss due to defect varied between $94.70 and $136.00 - an average of $121.00 per acre. The combined losses due to termites, decay, and fire were assessed in felling coupes totalling 588 acres within nine compartments. Comparisons are made between the attack by Coptotermes spp. in coastal forests and that by the alpine termite (Porotermes adamsoni (Froggatt)). (Author)
PB-175 901 HC$3.00 MF$0.65

EXPERIMENTS TO DETERMINE THE POPULATIONS OF TREE-DWELLING COLONIES OF TERMITES (COPTOTERMES ACINACIFORMIS (FROGGATT) AND C. FRENCHI HILL),
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Entomology.
For primary bibliographic entry see Field 6C.
PB-175 902 HC$3.00 MF$0.65

THE CONTROL OF TERMITES (COPTOTERMES SPP.) IN BLACKBUTT (EUCALYPTUS PILULARIS),
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Entomology.
For primary bibliographic entry see Field 6C.
PB-175 903 HC$3.00 MF$0.65

PRODUCTION, PRICES, EMPLOYMENT, AND TRADE IN PACIFIC NORTHWEST FOREST INDUSTRIES.
Quarterly rept.,
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
Thomas E. Hamilton. 1967, 30p Rept. no. 2
Prepared in cooperation with Washington State Dept. of Natural Resources, Oregon State Dept. of Forestry, and Department of Commerce, Washington, D. C. See also PB-174 951.

Descriptors: (*Forestry, Economics), Employment, Commerce, Money, Industries, Production, Wood, Volume, Plywood, Costs, Tables, Oregon, Washington (State).

The quarterly report presents current information on the timber situation in Oregon and Washington, including data on timber harvest, lumber and plywood production and prices; employment in the forest industries; international trade in logs, lumber, and plywood; volume and average prices of stumpage sold by public agencies; and other related items. Cooperation in supplying data has been received from a number of sources. These include the Washington State Department of Natural Resources; Oregon State Department of Forestry; U.S. Department of Commerce; U.S. Department of the Interior, Bureau of Land Management and Bureau of Indian Affairs; U.S. Department of Agriculture, Forest Service, Region 6; and a number of private industry associations, firms, and individuals. Much of the statistical data are from secondary sources and are brought together to make such information more readily available. (Author)
PB-175 963 HC$3.00 MF$0.65

ANNUAL LOSSES FROM DISEASE IN PACIFIC NORTHWEST FORESTS.
Forest Service Resource Bull.
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.
1967, 23p FSRB-PNW-20

Descriptors: (*Forestry, *Economics), Trees, Growth, Volume, Wood, Parasites, Mortality rates, Production, Degradation, Tables, Oregon, Washington (State).

The report presents current estimates of annual disease impact on forest productivity of Oregon and Washington. It is concerned exclusively with losses of timber volumes and of potential timber growth in today's forests. Annual loss from disease in this region is estimated at 3,133 million board feet or 403 million cubic feet. This is about 13 percent of the total annual growth including the mean periodic growth of seedlings and saplings. Of this loss, 162 million cubic feet is potential growth prevented by disease, 129 million is mortality, and 112 million is cull. West of the Cascade Range, annual loss is 234 million cubic feet, of which 92 million is cull from heart rots. East of the Cascades, annual loss is 169 million cubic feet, of which 91 million is growth loss and only 20 million is cull. More than half of the growth loss east of the Cascades is caused by dwarfmistletoes. Greatest losses occur in Douglas-fir (139 million cubic feet annually), western hemlock (88 million), true firs (62 million), and ponderosa pine (40 million). Principal causes of loss are dwarfmistletoes (148 million cubic feet), root rots (115 million), and heart rots (110 million). Cubic-volume losses are now about equally divided between young growth and old growth. As young stands replace old ones, cull from heart rots will decrease but growth-reducing diseases will become more important. Effective controls for some diseases are now or will soon be available, but most diseases will continue to cause heavy losses indefinitely unless research efforts are made proportionate to the values at stake. (Author)
PB-176 050 HC$3.00 MF$0.65

PONDEROSA PINE BIBLIOGRAPHY THROUGH 1965.
Research paper,
Intermountain Forest and Range Experiment Station, Ogden, Utah.
Elvera A. Axelton. 1967, 156p FSRP-INT-40

Descriptors: (*Trees, Bibliographies), (*Forestry, Bibliographies), Subject indexing, Damage, Protection, Control.

Ponderosa pine (Pinus ponderosa Laws.) is one of the most important softwood species in the United States. Because of its extensive range and economic importance, considerable research has been conducted on this valuable species. The published results of these research efforts provide an impressive number of references. The subject index follows the scheme suggested in Forest Service Handbook 1673.1, 'Organizing collections by Oxford System.' The bibliography has been compiled primarily for Silviculturists; therefore material pertaining to forest pests has been indexed under 'Forest Damage and Protection.' Many articles in these categories deal with both damage and control and therefore these subjects have been consolidated under one heading. Only articles dealing primarily with control were indexed under 'Protection.' (Author)
PB-176 051 HC$3.00 MF$0.65

SOME CHEMICAL PROPERTIES OF FOREST SOILS IN THE VIRGINIA-CAROLINA PIEDMONT.
Forest Service Research Paper,
Southeastern Forest Experiment Station, Asheville, N. C.
Lino Della-Bianca, and Carol G. Wells. Jul 67, 20p FSRP-SE-28

Descriptors: (*Forestry, Soils), Chemical properties, Sampling, Calcium, Physical properties, Soil mechanics, Virginia, North Carolina, South Carolina, Tables.

Chemical properties are presented for a number of soils found in hardwood and pine-hardwood upland forest stands in the Virginia-Carolina Piedmont. Well-stocked, second-growth stands distributed over an extensive area and having a wide range in site index were used for the study. Calcium contents were significantly different between soil series, but generally it was found that soil series or soil types are impractical for nutrient levels. (Author)
PB-176 081 HC$3.00 MF$0.65

3. ASTRONOMY AND ASTROPHYSICS

3A. Astronomy

A STATISTICAL AND ASTROPHYSICAL INVESTIGATION OF EMISSION-LINE STARS AND PLANETARY NEBULAE IN THE SOUTHERN MILKY WAY.
Final rept.,
Dearborn Observatory Evanston Ill
Karl G. Henize. Sep 67, 10p
Contract Nonr-1228 (19)

Descriptors: (*Astronomical data, *Nebulae), (*Stars, Astronomical data), Astronomical observatories, Data processing systems, Telescopes, Astronomical cameras, Photography.

The Principal Investigator visited Mt. Stromlo Observatory from September 1961 through June 1962 under the auspices of this contract to make observations of emission-line stars and planetary nebulae in the southern Milky Way which were discovered during a previous research program. Although many phases of data reduction were still not completed by the end of this extension, the work on the planetary nebulae was essentially completed. (Author)
AD-658 513 HC$3.00 MF$0.65

OBSERVATIONS OF QUASI-STELLAR AND HARO-LUYTEN BLUE OBJECTS,
Chicago Univ Ill
W. A. Hiltner, Anne P. Cowley, and Rudolph E. Schild. 28 Jun 66, 8p
Grant NSF-GP-5265
Prepared in cooperation with Yerkes Observatory, Williams Bay, Wis.
Availability: Published in Publications of the Astronomical Society of the Pacific v78 n464 p464-70 Oct 1966.

Descriptors: (*Astronomical observatories, *Spectrographic cameras), Diffraction gratings, Resolution, Absorption, Stars, Colors, Spectroscopy, Tables.

In February 1966 the spectrograph was used on the 82-inch telescope of the McDonald Observatory to secure spectrograms of quasi-stellar objects and Haro-Luyten blue objects. The wavelength region covered depended somewhat on the colors of the sources but was generally between 3800 and 7000 A. A nominal dispersion of 200 A/mm was used throughout the program. Three of the spectrograms are shown in Plate I. The image tube itself is capable of giving significantly higher resolution, but with the introduction of the transfer lenses and photographic emulsions not only is the resolution reduced but the spectrograms lose the crispness usually associated with classic spectroscopy. The nineteen Haro-Luyten objects were selected according to observing convenience, without reference to their colors, from a set of finding charts. Only two of them, both shown in Plate I, showed emission lines. An additional 16, which are listed in Table I, all displayed hydrogen absorption spectra. A well-exposed spectrogram of T 1523 shows no features in emission or absorption. (Author)
AD-658 699 Not available from CFSTI.

RADAR DETERMINATION OF THE ROTATIONS OF VENUS AND MERCURY,
Massachusetts Inst of Tech Lexington Lincoln Lab
Irwin I. Shapiro, Rolf B. Dyce, and Gordon H. Pettengill. 16 Sep 66, 11p Rept no. JA-2899
ESD-TR-67-475
Contract AF 19 (628)-5167
Prepared in cooperation with Cornell-Sydney Univ. Astronomy Center, Ithaca, N. Y., and Arecibo Ionospheric Observatory, Puerto Rico.
Availability: Published in Astronomical Journal v72 n3 p351-9 Apr 1967.

Descriptors: (*Radar echo areas, *Venus (Planet)), (*Mercury (Planet), Radar echo areas), Rotation, Scattering, Ionosphere, Reflectivity, Solar systems, Maps, Astronomical observatories.

By measuring the frequency dispersion of time-gated radar echoes from Venus and Mercury at the Arecibo Ionospheric Observatory, the apparent rotation rates of these planets have been unambiguously determined. The combination of many such measurements made over a period of time has permitted a separation of the intrinsic rotation from the contribution of the relative orbital motion of the earth and the target planet. From observations over a three-month period surrounding the inferior conjunction of 1964, we find that Venus has a solar rotation period (i.e., with respect to the planet-sun line) of 117 plus or minus 1 days and a sidereal rotation period of 245.1 plus or minus 2 days (retrograde); its rotation axis has a declination of -66.7 plus or minus 1 deg and a right ascension of 90.3 plus or minus 1 deg (1950.0). The inclination of the axis is -89.8 plus or minus 1 deg with respect to the ecliptic and -86.7 plus or minus 1 deg with respect to the orbital plane of Venus. These results are consistent with Venus making four complete axial rotations as seen by an earth-based observer between inferior conjunctions. For such a retrograde rotation a sidereal period of 243.16 days is required. Data obtained near the inferior conjunctions of Mercury in April and August 1965 indicate that the axial rotation of Mercury is direct and has an average solar period of 176 plus or minus 9 days and a sidereal period of 59 plus or minus 3 days. The direction of the rotation axis, although not well determined by these data, seems to be inclined to the normal to Mercury's orbital plane by less than 28 degrees. (Author)
AD-658 774 Not available from CFSTI.

THE EINSTEIN REDSHIFT IN WHITE DWARFS,
Palomar Observatory Pasadena Calif
Jesse L. Greenstein, and Virginia L. Trimble. 1 Feb 67, 18p
AFOSR-67-2197
Contract AF 49 (638)-1323
Prepared in cooperation with Carnegie Institution of Washington, D. C., and California Inst. of Tech., Pasadena.
Availability: Published in Astrophysical Journal v149 n2 p283-98 Aug 1967.

Descriptors: (*Stars, Astrophysics), (*Astronomical observatories, Stars), Blackbody radiation, Gravity, Velocity, Motion, Spectra (Visible + ultraviolet), Luminescence, Sensitivity, Helium, Surface properties, Temperature, Iron, Theory.

Low-dispersion radial velocities of 53 white dwarfs have been measured with type, velocity, space-motion components, temperature and radius, for each star. Wide binary systems and 6 white dwarfs in the Hyades provide direct measures of gravitational redshift, with a mean value of +51 km/sec. A number of white dwarfs are members of the high-velocity population. Pressure shifts of He I lines make their velocities more negative. The temperature scale is obtained from colors and, combined with luminosities, gives radii. The median radial velocity for 37 DA stars is +58 km/sec, and the median radius 0.0107 R sun; this redshift and radius give a mass of 0.98 M sun, almost certainly too high. The theoretical M-R relation of a zero-temperature degenerate star predicts a redshift for various compositions. A systematic change in luminosity, or a small temperature reduces the median radius to 0.0093 R sun. The mass derived from the redshift is then 0.86 M sun. These values agree with the Hamada-Salpeter mass-radius relation, if the interior is pure helium. An iron core gives a mass of 0.73 M sun, but a radius of 0.008 R sun, sufficiently small to require substantial changes in the temperature scale. The mass derived from radial velocities is higher than previously found from radii only. (Author)
AD-658 775 Not available from CFSTI.

A SPECTROPHOTOMETRIC STUDY OF DELTA SCUTI AND DELTA DELPHINI.
Revised ed.,
Palomar Observatory Pasadena Calif
L. V. Kuhi, and I. J. Daniger. 28 Dec 66, 9p
AFOSR-67-2200
Contract AF 49 (638)-1323
Revision of manuscript submitted 21 Nov 66. Prepared in cooperation with Carnegie Institution of Washington, D. C., and California Inst. of Tech., Pasadena.
Availability: Published in Astrophysical Journal v149 n1 pt1 p47-53 Jul 1967.

Descriptors: (*Stars, *Spectroscopy), (*Spectrophotometers, Stars), Luminescence, Temperature, Light, Velocity, Energy, Measurement, Intensity, Gravity.

The results of a simultaneous spectrophotometric and spectroscopic analysis of Scuti and Delphini are given and include the relative variations of light, temperature, and radial velocity. Delta Scuti has a light, temperature, and radial velocity variation of 0.15 mag, 250K, and 9 km/sec, respectively. For Delta Del the same quantities are 0.10 mag, 200K, and 5.5 km/sec. Using the mean gravities given by log g approximately equals 2.8 and approximately equals 3.2, respectively, for Sct and Delta Del, we conclude that the value of Q in the period-density law is lower than theory would suggest. There also appears to be a difference in the masses of these two stars, which are lower than expected from their location in the H-R diagram. (Author)
AD-658 777 Not available from CFSTI.

OBSERVATION OF THE 94 ALPHA AND 148 DELTA HYDROGEN AND 94 ALPHA HELIUM EMISSION LINES IN THE ORION NEBULA.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 3B.
AD-658 911 Not available from CFSTI.

ASTRONOMICAL CONSTANTS AND PLANETARY EPHEMERIDES DEDUCED FROM RADAR AND OPTICAL OBSERVATIONS.
Journal article,
Massachusetts Inst of Tech Lexington Lincoln Lab
Michael E. Ash, Irwin I. Shapiro, and William B. Smith. 16 Sep 66, 14p Rept no. JA-2893
ESD-TR-67-474
Contract AF 19 (628)-5167
Availability: Published in Astronomical Journal v72 n3 p338-50 Apr 1967.

Descriptors: (*Astronomy, *Relativity theory), Astronomical observatories, Radar, Venus (Planet), Mercury (Planet), Earth (Planet), Mass-energy relation, Tables.

A number of astronomical constants have been deduced by processing planetary radar data spanning the interval from 1959 to July 1966 and U. S. Naval Observatory optical data extending from 1950 to 1965. Results obtained using general relativity (Newtonian) theory with their formal standard errors are: a.u., 499.004786 (499.004785) plus or minus 0.000005 light sec; Mercury radius, 2434 (2440) plus or minus 2 km; Venus radius, 6056 (6056) plus or minus 1 km; Mercury mass, 6021000 (6029000) plus or minus 53000; Venus mass, 408250 (408450) plus or minus 120; earth plus moon mass, 328900 (328950) plus or minus 60; Mars mass, 3111000 (3107000) plus or minus 9000; earth-moon mass ratio 81.3030 (81.3024) plus or minus 0.005. The planetary masses are given as inverses in terms of the solar mass. Corresponding mass density ratios are 0.9528 (0.9527) plus or minus 0.0008 for Venus/earth and 0.995 (0.986) plus or minus 0.009 for Mercury/earth. The orbital elements of Mercury, Venus, and the earth-moon barycenter were obtained simultaneously and the accompanying formal standard errors are substantially lower than heretofore achieved. The over-all goodness-of-fit measure was 0.63 for general relativity theory and 0.65 for Newtonian theory. Only for the fraction of data comprising time-delay observations of Mercury was a significant difference between the two theories noted; for this fraction general relativity gave epsilon = 0.7 and Newtonian theory 1.3. (Author)
AD-658 914 Not available from CFSTI.

RADAR MEASUREMENTS AT 70 cm OF VENUS AND MERCURY,
Arecibo Ionospheric Observatory Puerto Rico
G. H. Pettengill, R. B. Dyce, and D. B. Campbell. 16 Sep 66, 11p
AFOSR-67-2201
Contract AF 49 (638)-1156
Prepared in cooperation with Cornell-Sydney Astronomy Center, Ithaca, N. Y.
Availability: Published in Astronomical Journal v72 n3 p330-7 Apr 1967.

Descriptors: (*Radar, *Astronomy), Radar echo areas, Venus (Planet), Solar systems, Mercury (Planet), Astronomical observatories, Surface properties, Roughness, Planets, Scattering.

The 1000-ft-diameter reflector and associated radar equipment of the Arecibo Ionospheric Observatory have been used to obtain measurements of delay and Doppler frequency shift for echoes returned from the planets Venus and Mercury during 1964 and 1965. A number of determinations of radar cross section and angular scattering law for these planets at an operating frequency of 430 Mc/sec have also been obtained. Venus is found to have a mean cross section of 0.14 of its physical cross section with variations of as much as plus

or minus 0.08 during the course of the observations in 1964. Its angular scattering law reflects a distribution of surface slopes significantly smoother than for the moon. Mercury displays a radar cross section between 0.06 and 0.07 of its physical cross section and a scattering law very similar to the moon's. (Author)
AD-658 955 Not available from CFSTI.

COMPARATIVE LUNAR-TERRESTRIAL COLORIMETRY.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
R. M. Hively, and J. K. Westhusing. 1966, 41p
NASA-TM-X-58008

Descriptors: *Colorimetry, *Lunar surface, Bibliography, Color, Composition, Experiment, Lunar, Particle, Rock, Size, Surface, Terrestrial.

For abstract, see STAR 05 21.
N67-35541 HC$3.00 MF$0.65

PROPER MOTION SURVEY WITH THE FORTY-EIGHT INCH SCHMIDT TELESCOPE. XII. SEVEN FAR-NORTHERN REGIONS,
Minnesota Univ., Minneapolis. Observatory.
William J. Luyten. 1 Mar 67, 41p
Grants NSF-G22254, NSF-GP-4309
See also PB-174 382.

Descriptors: (*Astronomical data, Tables), (*Stars, Motion), Telescopes, Astronomical cameras, Position finding.

In continuation of the regions reported on in Nos. IV and IX of this series the present publication gives data for 2816 proper motion stars found in six circumpolar regions and one region at declination +48.
PB-175 946 HC$3.00 MF$0.65

3B. Astrophysics

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 9B.
AD-658 439 HC$3.00 MF$0.65

ON EQUATION FOR CHARACTERISTIC CURVES OF A SPECTROPHOTOMETRIC EMULSION,
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 14E.
AD-658 457 HC$3.00 MF$0.65

AN ANALYSIS OF THE DISTRIBUTION OF RADIO SOURCES,
California Inst of Tech Pasadena
Robert V. Wagoner. 1967, 1p
Contract Nonr-220 (47), Grant NSF-GP-5391
Prepared for presentation at the Meeting of the American Astronomical Society (123rd), 27-30 Dec 1966.
Availability: Published in The Astronomical Journal v72 n3 1p Apr 1967.

Descriptors: (*Extraterrestrial radio waves, Sources), Galaxies, Anomalies, Radio astronomy, Statistical analysis.

A statistical study of the distribution of radio sources on the sky has been carried out, motivated by Arp's hypothesis of a relationship between these objects and peculiar galaxies. The distribution of distances from each peculiar galaxy in Arp's catalogue to the near-tween these classes of objects. (The correlation persisted when Vorontsov-Vel'yaminov's catalogue of interacting galaxies was used in place of Arp's catalogue.) However, the severe incompleteness of Arp's catalogue prevents one from knowing whether this represents a physical association. Due to this fact, catalogues of radio sources complete to some flux level have been analyzed for possible pairing or clustering. The distributions of first and second nearest neighbor distances among the sources in the 3CR, 4C, and Parkes catalogues have been studied. Possibly significant deviations from a random distribution appear to be present in some cases, especially for sources in the Parkes catalogue. However, this may be due to the methods used in compiling the catalogues. (Author)
AD-658 691 Not available from CFSTI.

FINAL STAGES OF EVOLUTION,
California Inst of Tech Pasadena
G. Shaviv. 1967, 1p
Contract Nonr-220 (47), Grant NSF-GP-5391
Prepared for presentation at the Meeting of the American Astronomical Society (123rd), 27-30 Dec 1966.
Availability: Published in The Astronomical Journal v72 n3 1p Apr 1967.

Descriptors: (*Stars, Models (Simulations)), Oxygen, Carbon, Novae, Stability, Beta decay.
Identifiers: Stellar evolution, White dwarf stars.

Detailed evolutionary calculations of models composed of oxygen and carbon were performed. The evolution was followed up to final phases, the last model being a white dwarf or a presupernova model. Stars are grouped according to the type of final model. It was found that models with masses greater than 2 M solar masses end their evolution with dynamical stability. Stars with masses in the range 1.44-2 M solar masses have not been investigated thoroughly; however, inverse beta decay may be important in these stars. Star with masses less than 1.44 M solar masses do not burn oxygen and those with masses less than 1 M solar masses do not burn carbon either. (Author)
AD-658 692 Not available from CFSTI.

ON THE FINE STRUCTURE OF ABSORPTION LINES,
California Inst of Tech Pasadena
J. N. Bahcall, R. A. Wolf, and E. E. Salpeter. 1967, 1p
Contract Nonr-220 (47), Grant NSF-GP-5391
Prepared for presentation at the Meeting of the American Astronomical Society (123rd), 27-30 December 1966. Prepared in cooperation with Cornell Univ., Ithaca, N. Y.
Availability: Published in The Astronomical Journal v72 n3 1p Apr 1967.

Descriptors: (*Absorption spectrum, *Interstellar matter), Density, Resonance, Proton cross sections, Photons, Silicon, Aluminum, Carbon, Nitrogen, Sulfur, Argon, Oxygen.
Identifiers: Quasars, Redshift.

The report indicates how the fine structure of resonant absorption lines can be used as an indicator of the density of the absorbing medium (or the distance from an infrared-emitting source). Also indicated is how the presence or absence of fine structure in some absorption lines that may be observed in quasi-stellar sources can be used to determine whether the absorption occurs in the intergalactic medium (in which case no fine structure is expected) or in the much denser medium surrounding the source (in which case fine structure is expected in many of the absorption lines). It also considers applications to the ultraviolet study of the interstellar medium by rockets and satellites.
AD-658 693 Not available from CFSTI.

THE MICROWAVE SPECTRUM OF VENUS IN THE FREQUENCY RANGE 18-36 Gc/SEC,
California Univ Berkeley Space Sciences Lab
P. H. Griffith, D. D. Thornton, and W. J. Welch. Sep 67, 15p Rept no. Ser-8-Issue-65
Contracts Nonr-222 (54), Nonr-222 (66)
Research supported in part by NASA, grant NsG-243-62.
Availability: Published in ICARUS v6 n2 p175-88 Mar 1967.

Descriptors: (*Venus (Planet), Radio astronomy), (*Microwaves, Venus (Planet)), Temperature, Atmosphere models, Carbon dioxide, Nitrogen, Water vapor, Clouds, Dust, Barometric pressure, Scattering, Particles.

The microwave emission from Venus was measured at seven frequencies in the interval 18 to 36 Gc/sec in July 1964 shortly after inferior conjunction. The resulting spectrum shows a fairly smooth but rapid decrease in the planet's brightness toward the higher frequencies. The measurements are compared with the spectra of several model atmospheres which contain CO2, N2 water vapor, liquid water clouds, and high dust or ice clouds. None of the model spectra exactly fit all the present measurements. A best fit for the model in which absorption is due to CO2 and N2 requires a surface pressure of about 200 atm. A best fit for the model which contains, in addition, water vapor and liquid water clouds requires about 12 gm/sq cm of the vapor and 0.06 gm/sq cm of liquid water clouds at a temperature of 240 degrees K. The nicest agreement is provided by a model which contains scattering particles. For dust particles of mean diameter 0.3 mm and dielectric constant 5, the required number of particles is 2.5 x 10 to the 6th power/sq cm. (Author)
AD-658 708 Not available from CFSTI.

THE CORONA FAR FROM THE SUN,
California Univ Berkeley Space Sciences Lab
John M. Wilcox. 1967, 8p
Contract Nonr-3656 (26)
Availability: Published in Astronomical Society of the Pacific Leaflet n455 1p May 1967.

Descriptors: (*Solar corona, Space environmental conditions), (*Solar wind, Space environmental conditions), Comets, Plasma medium, Solar radiation, Magnetic fields, Solar flares, Space probes, Scientific satellites, Diurnal variations, Cosmic rays.

The article discusses recent findings about the extreme outer atmosphere of the sun, as found by space probes.
AD-658 811 Not available from CFSTI.

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5A.
AD-658 834 HC$3.00 MF$0.65

OBSERVATION OF THE 94 ALPHA AND 148 DELTA HYDROGEN AND 94 ALPHA HELIUM EMISSION LINES IN THE ORION NEBULA.
Journal article,
Massachusetts Inst of Tech Lexington Lincoln Lab
Mark A. Gordon, and Marion L. Meeks. 19 May 67, 6p Rept no. JA-3064
ESD-TR-67-477
Contract AF 19 (628)-5167
Availability: Published in The Astrophysical Journal v149 pL21-5 Jul 1967.

Descriptors: (*Radio astronomy, *Nebulae), Hydrogen, Temperature, Helium, Intensity, Emissivity, High frequency, Thermal properties, Equilibrium.

Observations of recombination lines near 7.8 GHz show line profiles to be nearly Gaussian and the gas to be out of thermodynamic equilibrium. Comparison of helium and hydrogen lines gives a temperature of 6653 degrees plus or minus 1010K. (Author)
AD-658 911 Not available from CFSTI.

MEASUREMENTS OF DISSOCIATIVE RECOMBINATION OF CO2 (+) IONS WITH ELECTRONS.
Technical rept.,
Pittsburgh Univ Pa Dept of Physics
Charles S. Weller, and Manfred A. Biondi. 9 Jun 67, 8p Rept no. TR-8
AROD-3187:8
Grant DA-ARO (D)-31-124-G518
Availability: Published in Physical Review Letters v19 n2 p59-61 Jul 10 1967.

Descriptors: (*Carbon dioxide, Recombination reactions), (*Planetary atmospheres, Carbon dioxide), Dissociation, Electron density, Afterglows, Mass spectroscopy, Atmosphere models, Mars (planet).

Models of the Martian ionosphere have been proposed in an effort to explain electron-density and neutral-atmosphere-density data obtained from the Mariner IV occultation experiment and from earth-based spectral observations. A feature of these models is the critical dependence of the predicted ionospheric electron density on the value of the dissociative recombination coefficient (CO2 (+)) between electrons and CO2 (+) ions, with some models apparently demanding an unusually large coefficient. A microwave-afterglow differentially pumped quadrupole mass spectrometer apparatus was applied to the study, and the results are given. (Author)
AD-658 934 Not available from CFSTI.

ABUNDANCES IN TWO EXTREMELY HIGH-VELOCITY STARS,
Palomar Observatory Pasadena Calif
David Koelbloed. 6 Feb 67, 19p
AFOSR-67-2198
Contract AF 49 (638)-1323
Prepared in cooperation with Carnegie Institution of Washington, D. C., and California Inst. of Tech., Pasadena.
Availability: Published in Astrophysical Journal v149 n2 p299-315 Aug 1967.

Descriptors: (*Stars, Abundance), Velocity, Sun, Ions, Galaxies, Excitation, Turbulence, Neutrons, Iron, Astronomical observatories.

Techniques of coarse and fine analysis based on curves of growth, were used to derive abundances in HD 2665 and HD 6755, metal-deficient stars of extremely high velocity. Abundances were compared with those in the Sun, using Conti's models for normal and metal-deficient K-giants; the ions, for normal abundances, were found to have higher excitation temperature than the neutral atoms, but this difference disappears in the metal-deficient stars. The turbulent velocities, from the curves of growth, are 0.7 km/sec for HD 6755 and 0.6 km/sec for HD 2665. Both stars move in retrograde orbits, with large W velocities, HD 2665 toward the galactic center and HD 6755 outward. If we adopt theta eff = 0.97, log g = 2.8, for HD 6755 and theta eff = 1.055, log g = 1.8, for HD 2665; the deficiencies of iron relative to the Sun are by factors of 11 and 37. In HD 2665 the heavy s-process elements show a deficiency with respect to iron of about a factor of 3. For C, N, and O a factor of 2 or 3 additional deficiency roughly fits the observations. (Author)
AD-659 001 Not available from CFSTI.

ISENTROPIC MODELS FOR FINAL STAGES OF STELLAR EVOLUTION.
California Inst of Tech Pasadena
G. Rakavy, and G. Shaviv. 1967, 24p
Contract Nonr-220 (47), Grant NSF-GP-5391

Descriptors: (*Models (Simulations), *Stars), Entropy, Photons, Neutrinos, Density, High-temperature research, Convection (Heat transfer), Sensitivity, Thermal stability, Oxygen.

In order to obtain a general, rough approximate picture of the final stages of evolution of stars, sequences of homogeneous-isentropic models have been constructed. During evolution, a star loses entropy by means of photon radiation or neutrino losses. Only when a nuclear fuel is ignited, the loss of entropy is halted or even a slight, insignificant, increase in entropy may occur. A star contracting through photon losses tends to be completely convective and thus homogeneous and isentropic. Detailed calculations of a few models seem to show that for stars heavier than about 2 solar masses, the deviations are small enough so that the general picture obtained by considering isentropic models is not changed in an essential way. (Author)
AD-659 048 HC$3.00 MF$0.65

METEOROID DAMAGE TO FILAMENTARY STRUCTURES.
Astro Research Corp., Santa Barbara, Calif.
R. H. Mac Neal. Sep 67, 30p NASA-CR-869, ARC-R-222
Contract NAS7-427

Descriptors: *Impact damage, *Micrometeoroid, *Tape, *Tube, *Wire, Computation, Damage, Filament, Fracture, Hollow, Impact, Penetration, Rate, Structure, Test, Thin, Wall.

For abstract, see STAR 05 21.
N67-35736 HC$3.00 MF$0.65

DIFFUSION OF SOLAR COSMIC RAYS AND THE POWER SPECTRUM OF THE INTERPLANETARY MAGNETIC FIELD.
State Univ. of Iowa, Iowa City. Dept. of Physics and Astronomy.
For primary bibliographic entry see Field 20H.
For abstract, see STAR 05 21.
N67-35866 HC$3.00 MF$0.65

DESCRIPTION OF SCIENTIFIC SOUNDING-ROCKET PROJECT S-18.
European Space Research Lab., Noordwijk (Netherlands).
For primary bibliographic entry see Field 4A.
For abstract, see STAR 05 21.
N67-35932 HC$3.00 MF$0.65

CONCLUSIONS CONCERNING THE GENERAL MAGNETIC FIELD OF THE SUN.
Sterrewacht Sonnenborgh, Utrecht (Netherlands).
M. G. Minnaert. 1966, 3p
Celebrative, 1966 3 P Presented At the Conf. on Concerning the General Magnetic Field of the Sun

Descriptors: *Corona, *Photosphere, *Solar magnetic field, *Sunspot, Axis, Brush, Field, Magnetic, Measurement, Polar, Rotation, Solar.

For abstract, see STAR 05 21.
N67-36098 HC$3.00 MF$0.65

A BALLOON BORNE X-RAY SURVEY OF THE CENTRAL REGION OF THE GALAXY.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
E. Boldt, H. Doong, G. Riegler, and P. Serlemitsos. Aug 67, 13p NASA-TM-X-55887, X-611-67-369
Presented At the 10th Intern. Conf. on Cosmic Rays, Calgary (Canada), June 1967

Descriptors: *Balloon flight, *Galaxy, *X-ray telescope, Australia, Balloon, Cesium, Counter, Detector, Flight, Gas, Iodide, Krypton, Photon, Scintillation, Spectrum, Telescope, X-ray.

For abstract, see STAR 05 21.
N67-36394 HC$3.00 MF$0.65

A RESETTABLE MONOSTABLE PULSE GENERATOR.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
N. M. Garrahan. Jul 67, 11p NASA-TM-X-55905, X-711-67-371

Descriptors: *Logic circuit, *Memory, *Pulsed generator, *X-ray analysis, Amplitude, Analysis, Blocking, Circuit, Detector, Galaxy, Generator, Logic, Measuring, Monostable, Particle, Pulse, Reset, Sampling, Sensor, X-ray.

For abstract, see STAR 05 21.
N67-36402 HC$3.00 MF$0.65

THE ELECTROMAGNETIC RADIATION ASSOCIATED WITH THE ENERGY DISSIPATED BY COSMIC RAYS IN INTERSTELLAR HYDROGEN.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
V. K. Balasubrahmanyan, E. Boldt, R. A. Palmeira, and G. Sandri. Jul 67, 21p NASA-TM-X-55894, X-611-67-357

Descriptors: *Cosmic ray, *Electromagnetic radiation, *Energy dissipation, *Hydrogen, *Interstellar gas, Atom, Bremsstrahlung, Cloud, Cosmic, Coulomb collision, Dissipation, Electromagnetic, Electron, Energy, Gas, Interaction, Interstellar, Radiation, Ray, X-ray.

For abstract, see STAR 05 21.
N67-36422 HC$3.00 MF$0.65

BISTATIC-RADAR IMAGING AND MEASUREMENT TECHNIQUES FOR THE STUDY OF PLANETARY SURFACES.
Stanford Univ., Calif. Radioscience Lab.
For primary bibliographic entry see Field 9F.
For abstract, see STAR 05 21.
N67-36611 HC$3.00 MF$0.65

ON THE EXPLOSIVE ORIGIN OF THE GALAXIES.
Sobre El Origen Explosivo de Las Galaxias
Observatorio de Cordoba (Argentina).
J. L. Sersic. Oct 66, 20p
in Spanish Sponsored By the Natl. Res. Council, Buenos Aires

Descriptors: *Explosion, *Galactic evolution, *Origin, Density, Ellipticity, Evolution, Galaxy, Interaction, Mass, Spiral, Theory.

For abstract, see STAR 05 21.
N67-36637 HC$3.00 MF$0.65

FINAL STATUS REPORT TO THE NATIONAL SCIENCE FOUNDATION, JANUARY 1, 1966 - JUNE 15, 1967.
Cornell Univ., Ithaca, N. Y. Center for Radiophysics and Space Research.
Aug 67, 11p CRSR-279
Grant NSF-GP-3488

Descriptors: (*Astrophysics, Scientific research), (*Nuclear reactions, Astrophysics), Neutrinos, Carbon, Models (Simulations), Absorption spectrum, Galaxies, X rays, Nebulae, Neutrons, Elementary particles, Charged particles.
Identifiers: Stellar evolution, Quasars, Redshift, Quarks.

Summary of research: Rates for neutrino energy losses; Pycno-nuclear reaction rates; Evolution of low mass carbon stars; Intergalactic absorption lines; Quasars and 'ghost images'; Radiative transfer of x-rays; Quark production in the galaxy; Neutron star matter.
PB-175 945 HC$3.00 MF$0.65

3C. Celestial Mechanics

CONVERGENCE OF THE VON ZEIPEL PROCEDURE,
Professional paper,
System Development Corp Santa Monica Calif
Richard B. Barrar. 20 Jul 67, 21p Rept no. SP-2810/000/01
Supersedes AD-651 585.

Descriptors: (*Celestial mechanics, *Perturbation theory), Theorems, Convergence, Hamiltonian, Periodic variations, Mapping (Transformations).
Identifiers: Von Zeipel's method.

Although it has long been realized that the von Zeipel procedure is an accurate method for solving problems in celestial mechanics, no mathematical proofs have been available to show that it actually converged. Recently such proofs have been given by Arnol'd and Barrar. The present paper is devoted to still another proof, much simpler than those previously given. The proof is based on a suggestion of A. N. Kolmogorov in the 1954 Doklady. (Author)
AD-658 479 HC$3.00 MF$0.65

4. ATMOSPHERIC SCIENCES

4A. Atmospheric Physics

IONIZATION AND DE-IONIZATION IN THE LOWER IONOSPHERE.
Final rept.,
Stanford Research Inst., Menlo Park, Calif.
I. G. Poppoff, and R. C. Whitten. 31 Mar 63, 113p
Contract AF 19 (604)-8355, ARPA Order-6-61

Descriptors: (*Ionosphere, Ionization), (*Ionospheric disturbances, Solar flares), Electron density, X rays, Background, Cosmic ray bursts, Absorption, Solar radiation, Radio signals, Recombination reactions, Photoelectric effect, Dissociation, Atmospheric temperature, Ions, Atmosphere models.
Identifiers: D layer, De-ionization.

A body of information pertaining to ionization and de-ionization in the lower ionosphere was compiled from various sources. Part of the data was derived from studies of geophysical observations, part of it from published and unpublished laboratory measurements, and part from other ionospheric studies. Models of lower ionospheric processes were prepared which are consistent with presently available data from these sources. (Author)
AD-418 467 HC$3.00

ENERGETICS OF THE MIDDLE ATMOSPHERE,
Rand Corp Santa Monica Calif
C. B. Leovy. Sep 67, 31p Rept no. P-3679
Prepared for Presentation at the Survey Symposium on Measurements in the Upper Atmosphere (ICMUA, IAMAP), General Assembly of IUGG (14th), Lucerne, Switzerland, September 28, 1967.

Descriptors: (*Stratosphere, *Water vapor), (*Mesosphere, *Ozone), Carbon dioxide, Photochemistry, Solar radiation, Ultraviolet radiation, Infrared radiation, Reaction kinetics, Rayleigh scattering, Solar spectrum.

The middle atmosphere is considered to be the region from 25 to 105 km including the middle and upper stratosphere, mesosphere, and mesosphere-thermosphere transition region up to the turbopause. In the lower portion, up to 80 km, energy inputs and losses are predominantly due to absorption and emission of radiation by ozone, carbon dioxide, and water vapor, with solar absorption by ozone and emission by carbon dioxide playing the major role. Recent computations of heating and cooling rates due to these gases have not led to essential changes, but uncertainties remain. The principle ones are due to uncertainty in the concentrations of water vapor and ozone.
AD-658 422 HC$3.00 MF$0.65

ACOUSTIC WAVES IN THE IONOSPHERE,
Pennsylvania State Univ University Park Ionosphere Research Lab
L. H. Wight. 20 Aug 67, 37p Rept no. Scientific-304
AFOSR-67-1904
Contract AF 49 (638)-1708

Descriptors: (*Mechanical waves, *Ionosphere), Acoustics, Density, Attenuation, Oscillation, Thermal properties, Propagation, Motion, Theses.

The independent solutions which correspond to an upgoing and downgoing acoustic wave in a viscous, non-heat conducting isothermal atmosphere are derived. The behavior of the perturbation density associated with the upgoing wave for large 1/Re is examined and found to be non-oscillatory. Houtl has shown that in the 100-130 kilometer region there are observed oscillations associated with the perturbation density of random acoustic waves. From the non-oscillatory behavior it is deduced that neither molecular nor eddy viscousity can be the damping mechanism. Further it is shown that including thermal conductivity cannot produce the observed oscillations. The thermal gradient in the atmosphere is proposed to be a possible source of wave attenuation. The propagation of the upgoing wave through a small temperature jump is examined, and the effect of the discontinuity on the wave amplitude is found to be significant. (Author)
AD-658 449 HC$3.00 MF$0.65

D-REGION PROCESSES IN NON-POLAR LATITUDES,
Pennsylvania State Univ University Park Ionosphere Research Lab
A. P. Mitra. 15 Jun 67, 101p Rept no. Scientific-299
AFCRL-67-0418
Contract AF 19 (628)-4014, Grant NSF-GP-5611

Descriptors: (*Ionosphere, Recombination reactions), Ions, Diurnal variations, Electron density, Solar eclipses, Ionospheric disturbances, Nitrogen oxides, Theory, Measurement, Electrons.

The report presents the results of a reexamination of three major areas of D region aeronomy, namely: the height distribution of nitric oxide, the distribution of the effective recombination coefficient and the nature and distribution of negative ions. For nitric oxide, a previous estimate by the author from the solar cycle variation in the D region electron density is supplemented by some new estimates from: observed diurnal variation of the electron density and from recent measurements of ion composition. These, and a few other ionospheric estimates currently available, as also considerations of the photochemistry of nitric oxide, indicate that a distribution consistent with most of these estimates is of the form n (NO) = 0.4 exp (-3700/T)n (O2) + 5 x 10 to the minus 7th power n (O). Values of the effective day time loss rate Psi have been obtained from simultaneous use of information on the ionizing radiation and several electron density profiles derived with rocket and ground-based experiments. Examination of these, as also the host of determinations on the effective recombination coefficient alpha' that have in the past been made from the variations in electron density or absorption with the time of the day or during eclipses and solar flares, indicate that: (i) alpha' has a value around 2 x 10 to the minus 7th power cu cm near 100 Km, (ii) the dissociative recombination coefficient for NO (+) is about the same as that for O (+2) (both being around 2 x 10 to the minus 7th power cu cm), and (iii) negative ions are not important above 70 Km during day and above 85 Km during night. The observational results appear to agree with an empirical relationship of the form. (Author)
AD-658 450 HC$3.00 MF$0.65

A SOLID STATE POLARIMETER SUITABLE FOR ROCKETBORNE IONOSPHERIC DIFFERENTIAL ABSORPTION MEASUREMENTS,
Pennsylvania State Univ University Park Ionosphere Research Lab
Dan H. Marshall. 31 May 67, 90p Rept no. Scientific-298 (E)
AFCRL-67-0373
Contract F19628-67-C-0301

Descriptors: (*Ionosphere, Instrumentation), Absorption, Measurement, Design, Calibration, Polarization, Airborne, Rockets, Noise, Vacuum apparatus, Reflection, Transistors, Radio waves.

The design of a solid state polarimeter is presented and compared to that of a previous polarimeter on the basis of phase shift, propagation delay, and amplitude response. For background, polarimeter uses in determining differential absorption by rocket-borne methods and wave polarization with regard to characteristics of the ionosphere and measurements thereof are reviewed. An optimum noise figure comparison is made for both a vacuum tube and a transistor low level input amplifier stage. A comprehensive outline of adjustment procedures is also presented, including a graphical presentation of the most significant system parameters. (Author)
AD-658 451 HC$3.00 MF$0.65

AN INTEGRATED METEOR RADAR SYSTEM FOR WIND AND DENSITY MEASUREMENTS IN THE UPPER ATMOSPHERE.
Final rept. 1 Mar 64-28 Feb 67,
Stanford Univ Calif Stanford Electronics Labs
Robert Nowak. May 67, 148p Rept no. SU-SEL-67-046
AFCRL-67-0347
Contract AF 19 (628)-3996
See also AD-648 080.

Descriptors: (*Radar, Upper atmosphere), (*Wind, Measurement), Density, Meteors, Data processing systems, Ionization trails, Scattering, Detectors, Accuracy.

The theory of radio reflection from meteor trails is reviewed, and, based on its predictions, the specifications for a multiparameter meteor radar are derived. The synthesis of a completely integrated, coherent pulse radar is described; with this radar, echo strength, range, elevation angle, and doppler shift of the signals reflected from trails can be measured. The main features of this system are digital recording and processing of the data; the use of a composite signal waveform that permits simultaneous measurement of range, amplitude, and doppler at low peak power; and the recording of both amplitude and sign of the doppler shift in one channel. Data are processed automatically; the radar station is inexpensive and reliable enough to provide the basis for multistation synoptic measurements of upper atmospheric winds. The performance of the system is analyzed and measurements with three antenna arrangements are described. Echo heights are determined directly at high elevation angles from range and angle of arrival. It is shown that the height of reflection can be related to the amplitude decay of a certain class of echoes. If these echoes are selected properly (a procedure for this selection is given) and if a daily variation of the decay/height relationship is taken into account, height can be estimated from signal decay to within plus or minus 1 km. At low elevation angles, winds are measured from the doppler shift of the trail echoes and their height is determined from the amplitude decay, using the relationship between them that was previously es-

tablished. With theoretical relationships, atmospheric density can be estimated directly from the echo decay. (Author)
AD-658 463 HC$3.00 MF$0.65

STUDIES OF AIRGLOW AND AURORA PHENOMENA USING INSTRUMENTATION TECHNIQUES.
Final rept. 16 Dec 63-28 Feb 67,
Northeastern Univ Boston Mass
Louis J. Nardone. 31 Mar 67, 42p
AFCRL-67-0431
Contract AF 19 (628)-3876
See also AD-652 855.

Descriptors: (*Sky brightness, Instrumentation), (*Aurorae, *Instrumentation), Upper atmosphere, Design, Interferometers, Photometers, Spectrometers, Tests, Solar eclipses, Temperature.

In support of the upper-atmosphere research program, work was conducted on the design construction and testing of instrumentation for the study of airglow and aurora phenomena. Summary descriptions are given of work performed by rocket instrumentation, ground-based equipment and instruments aboard high-flying aircraft. References are made to indicate where the material is published. Summaries are also presented of papers being prepared on interferometric studies of the lambda 5577A emission temperatures in aurora and of the lambda 10830A helium emission layer in the upper atmosphere. A third paper describes initial work performed on the theory of the F layer. (Author)
AD-658 466 HC$3.00 MF$0.65

PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON EQUATORIAL AERONOMY (2d),
Laboratorio de Fisica Espacial Sao Jose Dos Campos (Brazil)
Fernando de Mendonca. 1965, 563p Rept no. LAFE-32

Descriptors: (*Ionosphere, Symposia), (*Upper atmosphere, Symposia), Terrestrial magnetism, Atmospheric sounding, Recombination reactions, Propagation, Cosmic rays, Ionospheric disturbances, Diurnal variations, Magnetic storms, Scientific satellites, Electrons, Sunspots, Atmospheric temperature, Photochemistry, Exosphere, Magnetosphere, Airglow.

Contents: Papers were given under the following topics: The D-region and lower atmosphere; Absorption in the equatorial ionosphere; The regular E region and equatorial Es; The regular low latitude F-region: bottom and topside studies; F-region disturbances and irregularities; Ionospheric drifts; Exosphere; Airglow; Low latitude current system including electrojet and magnetic variations; Magnetic and ionospheric storms; Low latitude magnetic pulsations.
AD-658 489 HC$3.00 MF$0.65

DESIGN FOR ORIENTATION BALLOON-BORNE EQUIPMENT,
Minnesota Univ Minneapolis Cosmic Ray Group
For primary bibliographic entry see Field 14B.
AD-658 529 HC$3.00 MF$0.65

SIMULTANEOUS DUST AND OZONE SOUNDINGS OVER NORTH AND CENTRAL AMERICA.
Atmospheric physics,
Minnesota Univ Minneapolis School of Physics and Astronomy
James M. Rosen. Aug 67, 223p Rept no. AP-25
Contract Nonr-710 (22)

Descriptors: (*Ozone, Stratosphere), (*Dust, Stratosphere), (*Atmospheric sounding, *Stratosphere), Tropopause, Sampling, North America, Central America, Transport properties, Atmosphere models, Ozone, Particle size.

Simultaneous soundings of ozone and sub-micron dust over North and Central America are reported. The results show considerably more dust in the equatorial stratosphere than in the middle latitude stratosphere. The relative maximum in the dust concentration observed near the level of the tropical tropopause and as far north as 60 degree is attributed to an equatorial dust source. The occasional appearance of a secondary dust maximum immediately above the mid-latitude tropopause is attributed to a form of transport other than that of eddy diffusion. The structure in the ozone and dust profiles appears to be highly correlated in the lower mid-latitude stratosphere. A quantitative model is presented describing the production and transport of dust in the stratosphere. (Author)
AD-658 546 HC$3.00 MF$0.65

AUTOMATIC COUNTING OF ATMOSPHERIC AEROSOLS COLLECTED WITH THE GOETZ ULTRACENTRIFUGE.
Research and development technical rept.,
Army Electronics Command Fort Monmouth N J
Hermann E. Gerber. Jun 67, 39p Rept no. ECOM-2852

Descriptors: (*Aerosols, Particle size), (*Air pollution, Aerosols), (*Ultracentrifuges, Aerosols), Sampling, Microphotography, Counting methods, Scanning, Accuracy, Statistical analysis.

An automatic counter was developed with which submicron aerosol data, collected with the Goetz Aerosol Spectrometer ultracentrifuge was rapidly and accurately evaluated. The data, consisting of 35mm microphotographs of large numbers of aerosols, were reduced by utilizing a unique track-scanning geometry in conjunction with a mechanical planar scanner. The photographic images of the aerosols and their locations on the data field were considered in detail, and appropriate corrections were derived to compensate for coincidence counting losses and the variable opacity of the images. Using the automatic counter, it was possible to count up to 500 aerosol images on a 2.0 sq cm area on each microphotograph. The counts were accomplished with a standard deviation of approximately 0.20 times the magnitude of the inherent statistical uncertainty of the data; also, each microphotograph was automatically scanned and counted in 140 seconds. (Author)
AD-658 667 HC$3.00 MF$0.65

SPECTRAL, SPATIAL, AND TEMPORAL VARIATIONS OBSERVED FOR OUTER ZONE ELECTRONS FROM 10 TO 100 keV WITH SATELLITE INJUN 3.
Doctoral thesis,
Iowa Univ Iowa City Dept of Physics and Astronomy
Theodore A. Fritz. Aug 67, 204p Rept no. 67-42
Contract Nonr-1509 (06), Grant NsG-233-62

Descriptors: (*Van Allen radiation belt, Electrons), (*Electron density, Measurement), Solar wind, Aurorae, Atmosphere models, Upper atmosphere, Magnetic storms, Theses, Scientific satellites, Solar radiation, Terrestrial magnetism.
Identifiers: Injun 3.

The report presents spectral, spatial, and temporal variations of outer zone electrons with energies from 10 keV to 100 keV observed with Injun 3. Strong observational support was found for the model of Taylor and Hones (1965) which adiabatically accelerates and then precipitates solar wind electrons in the auroral zone during magnetically active periods.
AD-658 710 HC$3.00 MF$0.65

A HIGH SPEED DIGITAL RECORDER FOR ATMOSPHERIC NOISE (SFERIC) WAVEFORMS,
Naval Ordnance Lab Corona Calif
V. E. Hildebrand, and D. A. Wulfing. 15 Sep 67, 28p Rept no. NOLC-739

Descriptors: (*Atmospherics, *Recording systems), Electromagnetic pulses, Lightning, Thunderstorms, Digital systems, Very low frequency, Extremely low frequency, Digital computers, Propagation.

A high speed system for the digital acquisition of atmospheric noise (sferic) waveforms is described. System operation and reduction of data to obtain the amplitude and phase spectrums of the sferic impulse between 0.5 and 60.0 kHz are discussed. (Author)
AD-658 722 HC$3.00 MF$0.65

RECENT OBSERVATIONS OF LOW-ENERGY CHARGED PARTICLES IN THE EARTH'S MAGNETOSPHERE.
Iowa Univ Iowa City Dept of Physics and Astronomy
L. A. Frank. Jul 67, 51p Rept no. 67-36
Contract Nonr1509 (06), Grant NsG-233-62
Prepared for presentation at the Summer Institute of Physics of the Magnetosphere, Boston College, June, 1967.

Descriptors: (*Magnetosphere, *Charged particles), Scientific satellites, Van Allen radiation belt, Magnetic storms, Protons, Electrons, Ions, Sensors.
Identifiers: OGO 3.

Several recent observations of low-energy proton and electron intensities within the energy range of about 100 eV to 50 keV in the eath's radiation zones with a sensitive array of electrostatic analyzers borne on the earth-satellite OGO 3 during mid-1966 are summarized. Measurements of charged particles of the extraterrestrial ring current during a moderate geomagnetic storm, of the low-energy proton and electron distributions in the vicinity of the midnight 'trapping boundary' near the magnetic equatorial plane, and of upper limits for proton and ion (100 eV = or < E/Q = or < 50 keV) energy fluxes deep within the innder radiation zone are presented together with several introductory comments concerning the morphology of the omnidirectional intensities of energetic electrons (E = or > 40 keV, = or > 230 keV and = or > 1.6 MeV) at the magnetic equator in the outer radiation zone. (Author)
AD-658 728 HC$3.00 MF$0.65

ENERGETIC POSITIVE IONS FROM PHOTOIONIZATION OF GASES,
Boeing Scientific Research Labs Seattle Wash
Geo-Astro Physics Lab
For primary bibliographic entry see Field 7E.
AD-658 788 HC$3.00 MF$0.65

ON THE ACCURACY OF CERTAIN APPROXIMATIONS FOR THE CHAPMAN FUNCTION.
Environmental Research papers no. 272,
Air Force Cambridge Research Labs L G Hanscom Field Mass
William Swider, Jr., and Margaret E. Gardner.
Aug 67, 16p Rept no. AFCRL-67-0468

Descriptors: (*Solar radiation, Attenuation), (*Special functions (Mathematical), Approximation (Mathematics)), (*Atmosphere, Attenuation), Accuracy, Trigonometry, Twilight, Geometry.
Identifiers: Chapman function.

Practical approximations for the Chapman function over the entire range of possible solar zenith angles are considered. The approximations are numerically evaluated for a selected number of parametric values. Comparison with the Chapman function on a percent difference basis is provided.

Some practical points regarding geometry are discussed for angles exceeding pi/2. (Author)
AD-658 826 HC$3.00 MF$0.65

INFLUENCE OF SINGLE SCATTERING ALBEDO ON REFLECTED AND TRANSMITTED LIGHT FROM CLOUDS,
Southwest Center for Advanced Studies Dallas Tex
Gilbert N. Plass, and George W. Kattawar. 12 Jul 67, 33p Rept no. Scientific-4
AFCRL-67-0450
Contract AF 19 (628)-5039

Descriptors: (*Clouds, *Light), Absorption, Monte Carlo method, Scattering, Albedo, Reflection, Optical properties, Thickness, Light transmission.

The dependence of the reflected and transmitted light from clouds on the single scattering albedo wo is studied. The multiply scattered path of the photon in the cloud is accurately simulated by Monte Carlo techniques. When the cloud is thin and the surface albedo A = 0, the reflected and transmitted radiances vary nearly as wo for fixed angles of incidence and observation and they depend strongly on the value of A. As wo becomes small and for thick clouds, the reflected radiance approaches more closely the value calculated from the single scattering phase function. As the absorption increases the transmitted radiance at the zenith becomes larger relative to the value near the horizon. Also as the optical thickness increases, the maximum of the transmitted radiance moves from the incident direction toward the zenith. The variations in the flux and the mean optical path are also discussed. (Author)
AD-658 830 HC$3.00 MF$0.65

MIDLATITUDE F REGION DENSITIES AND TEMPERATURES AT SUNSPOT MINIMUM.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
J. V. Evans. 21 Aug 67, 54p Rept no. TN-1967-41
ESD-TR-67-479
Contract AF 19 (628)-5167

Descriptors: (*Ionosphere, Measurement), (*Radar, Ionosphere), Sunspots, Thickness, Electron density, Temperature, Periodic variations, Heat flux, Photoelectrons, Diurnal variations.
Identifiers: Millstone radar.

Results obtained for F region densities and temperatures using the Millstone Hill Ionospheric Radar for the year 1964 are presented. The measurements were made during 30-hour periods which followed at intervals of about two weeks throughout the year. The data obtained in each month have been averaged to yield a mean electron density profile and mean ion and electron temperature curves for each hour in the day. These curves were in turn used to construct plots showing contours of constant temperature and density as functions of altitude and time for each month. In addition, the annual variation of the midday and midnight densities and temperatures was obtained. The seasonal anomaly in the F region peak electron density is evident though less pronounced than at years of high sunspot number. The F region layer thickness undergoes a smooth transition from winter to summer, being greatest in summer. It is shown that the daytime temperatures exhibit no marked seasonal dependence, and hence temperature effects (e.g., on reaction rates) cannot be invoked as the cause. The most striking nighttime phenomenon is the high electron temperature encountered in winter (Te/Ti approximately equals 2.0) compared with summer. Evidence is presented for the existence of a flux of fast photoelectrons arriving from the conjugate ionosphere. The nighttime heating of the F region is thought to be caused by heat conducted down from the protonosphere together, in winter months, with the flux of fast photoelectrons from the conjugate hemisphere. During the daytime, heat appears to be conducted down through the 500-km altitude level at a rate of approximately equals 5 x 10 to the 9th power eV/sq cm/sec. (Author)
AD-658 837 HC$3.00 MF$0.65

LOW FREQUENCY ELECTRIC FIELD CHARACTERISTICS OF CLEAR AIR TURBULENCE.
Final rept. 15 Mar 66-15 Jul 67,
Honeywell Inc St Paul Minn Research Dept
H. W. TenBroek, and C. R. Seashore. 15 Jul 67, 157p Rept no. 12037-FR1
AFCRL-67-0457
Contract AF 19 (628)-5983

Descriptors: (*Atmospheric motion, Electric fields), Electrostatic precipitation, Airborne, Sensors, Measurement, Extremely low frequency, Detection.

The report covers work done to investigate the low-frequency electric field characteristics of clear air turbulence. A description is given of the electric field sensing system designed and constructed by Honeywell and installed in five Northwest Airlines 720B passenger jets. The equipment was used to gather experimental data on the correlation of electric field activity with CAT, when encountered, during the scheduled flights of these aircraft in the period between October 1966 and June 1967 (a total flight time for all five CAT units of approximately 4300 hours). In this period, a total of 2,320 hours of recorded electric field data was obtained, during which 131 pilot-indicated encounters with CAT occurred. An investigation of the correlation of these encounters with the recorded data is presented, and the effects of various noise sources on system operation are discussed. The results of the data-taking program indicate that significant electrical activity occurred prior to and during 51.5 percent of those pilot-indicated CAT encounters exhibiting g-activity greater than plus or minus .05 g. Meteorological analyses of weather conditions in the vicinity of the encounters, useful in differentiating between the types of CAT encountered and in substantiating pilot-indicated events, could not be performed within the scope of the program. (Author)
AD-658 875 HC$3.00 MF$0.65

ELECTRON TEMPERATURE AND ION COMPOSITION IN THE F1 REGION.
Journal article,
Massachusetts Inst of Tech Lexington Lincoln Lab
John V. Evans. 31 Dec 66, 14p Rept no. JA-2883
ESD-TR-67-473
Contract AF 19 (628)-5167
Availability: Published in Journal of Geophysical Research v72 n13 p3343-55 Jul 1 1967.

Descriptors: (*Ionosphere, Electrons), Incoherent scattering, Radar reflections, Ions, Temperature, Radar, Measurement.
Identifiers: Millstone radar.

By employing a radar system operating at 23-cm wavelength with the beam directed obliquely, it has been possible to obtain Thomson scatter echoes from the ionosphere in the height range 100-300 km that are free from 'ground clutter' contamination. The measurements obtained with this system therefore supplement earlier results obtained using the Millstone Hill ionospheric radar, which has a vertically directed beam, and make it possible to obtain the electron and ion temperature distribution over the entire height interval 130-800 km approximately. The interpretation of the signal spectrums obtained with the oblique incidence radar requires that an assumption be made about the temperature of either the electrons or the ions, or about the ion composition. In the analysis presented here of the 1964 measurements it was assumed that the ion and neutral temperatures are the same up to a height of about 250 km and that only O (+) ions prevail at this height. Thus the ion temperature could be determined for 250-km altitude, and its dependence for lower heights was assumed to follow the same exponential law as in the CIRA 1965 model atmosphere. It was then possible to determine the electron temperature and the ratio of (O+) to (O2+ + NO+) ions in the height range 135-250 km. These results are presented and compared with rocket determinations. (Author)
AD-658 912 Not available from CFSTI.

A SEARCH FOR MASSIVE PARTICLES IN COSMIC RAYS.
Michigan Univ Ann Arbor Office of Research Administration
For primary bibliographic entry see Field 20H.
AD-659 049 Not available from CFSTI.

TEMPERATURE, PRESSURE, DENSITY AND WIND MEASUREMENTS IN THE UPPER STRATOSPHERE AND MESOSPHERE, 1965.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
J. J. Horvath, L. B. Katchen, W. S. Smith, P. C. Swartz, and J. S. Theon. Sep 67, 95p NASA-TR-R-263

Descriptors: *Mesosphere, *Pitot-static tube, *Sounding rocket, *Stratosphere, *Weather data recorder, Altitude, Analysis, Data, Density, Meteorology, Pressure, Recorder, Rocket, Sounding, Temperature, Upper atmosphere, Weather, Wind.

For abstract, see STAR 05 21.
N67-35777 HC$3.00 MF$0.65

MODIFICATIONS OF ION-DENSITIES DUE TO TEMPERATURE VARIATIONS.
National Aeronautics and Space Inst., Bandung, (Indonesia).
R. L. Kusumanto. 1967, 2p REPT.-5
Presented At the Iqsy-cospar Symp., London, Jul. 1967

Descriptors: *Ion density, *Temperature effect, Activity, Density, Electron, Ionosphere, Langmuir probe, Solar.

For abstract, see STAR 05 21.
N67-35880 HC$3.00 MF$0.65

NEUTRAL AIR WAVES IN THE THERMOSPHERE.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
H. Volland. Aug 67, 46p NASA-TM-X-55901, X-621-67-370

Descriptors: *Eigenvalue, *Gravity wave, *Thermosphere, Acoustic, Air, Atmosphere, Characteristic, Conduction, Drag, Equation, Gravity, Heat, Ion, Molecular, Neutral, Viscosity, Wave.

For abstract, see STAR 05 21.
N67-35911 HC$3.00 MF$0.65

DESCRIPTION OF SCIENTIFIC SOUNDING-ROCKET PROJECT S-18.
European Space Research Lab., Noordwijk (Netherlands).
R. Jaeschke. Feb 67, 15p ESRO-SN-67

Descriptors: *Ammonia, *Comet, *Fluorescent emission, *Photochemistry, *Sounding rocket, *Upper atmosphere, Atmosphere, Cloud, Dissociation, Emission, Fluorescence, Intensity, Ionization, Rocket, Sounding, Spectral, Spectrography, Tail, Upper.

For abstract, see STAR 05 21.
N67-35932 HC$3.00 MF$0.65

MAGNETIC AND VELOCITY EFFECTS ON IONOSPHERIC ELECTRON CURRENT TO CYLINDRICAL ELECTROSTATIC PROBES.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
N. J. Miller. Aug 67, 52p NASA-CR-88356, TR-705
Contract NGR-21-002-060

Descriptors: *Electron energy, *Ionospheric current, *Magnetic field, *Space probe, Current, Cylinder, Electron, Electrostatic, Energy, Explorer satellite, Field, Ionospheric, Magnetic, Measurement, Modulation, Probe, Satellite, Space, Thesis, Velocity.

For abstract, see STAR 05 21.
N67-36082 HC$3.00 MF$0.65

GEOMAGNETICALLY TRAPPED ALPHA PARTICLES.
State Univ. of Iowa, Iowa City. Dept. of Physics and Astronomy.
S. M. Krimigis, and J. A. Van Allen. Jul 67, 70p NASA-CR-88361, REPT.-67-29
Contract NAS1-2973, Grant NSG-233-62

Descriptors: *Alpha radiation, *Geomagnetically trapped particle, *Injun satellite, Alpha, Detection, Detector, Geomagnetic, Measurement, Observation, Particle, Proton, Radiation, Satellite, Trapped particle.

For abstract, see STAR 05 21.
N67-36120 HC$3.00 MF$0.65

TOTAL ELECTRON CONTENT MEASUREMENTS BY DIFFERENTIAL FARADAY ROTATION METHOD AT LOW LATITUDES.
Comissao Nacional de Atividades Espaciais, Sao Jose Dos Campos (Brazil). Laboratorio de Fisica Espacial.
O. G. Almeida, and H. Waldman. 20 Apr 67, 71p LAFE-56

Descriptors: *Beacon satellite, *Electron density, *Faraday rotation, Artificial, Beacon, Brazil, Content, Cycle, Density, Electron, Frequency, Ionosphere, Low, Measurement, Satellite, Solar.

For abstract, see STAR 05 21.
N67-36195 HC$3.00 MF$0.65

RECENT RESULTS IN THE ATMOSPHERIC REGION ABOVE 200 KM AND COMPARISONS WITH CIRA 1965.
Smithsonian Astrophysical Observatory, Cambridge, Mass.
L. G. Jacchia. 7 Jul 67, 31p NASA-CR-88351, SAO SPECIAL REPT.-245
Grant NSG-87-60
Presented At the 9th Meeting of Cospar, London, 23-29 Jul. 1967

Descriptors: *Atmospheric temperature, *Density measurement, *Upper atmosphere, Atmosphere, Bibliography, Composition, Density, Diurnal, Geomagnetic, Helium, Hydrogen, Measurement, Region, Season, Solar, Temperature, Upper, Variation.

For abstract, see STAR 05 21.
N67-36451 HC$3.00 MF$0.65

ELECTRON OMNIDIRECTIONAL INTENSITY CONTOURS IN THE EARTH'S OUTER RADIATION ZONE AT THE MAGNETIC EQUATOR.
State Univ. of Iowa, Iowa City. Dept. of Physics and Astronomy.
L. A. Frank, and H. D. Owens. Jul 67, 31p NASA-CR-88359, REPT.-67-40
Grant NSG-233-62

Descriptors: *Electron intensity, *Magnetic equator, *Radiation belt, Belt, Charge, Earth, Electron, Energy, Equator, Explorer xiv satellite, Function, Geiger-mueller counter, Graph, Intensity, Magnetic, Measurement, Omnidirectional, Particle, Radiation, Satellite, Threshold.

For abstract, see STAR 05 21.
N67-36658 HC$3.00 MF$0.65

AN APPROXIMATE ANALYTICAL METHOD FOR STUDYING ENTRY INTO PLANETARY ATMOSPHERES.
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 22C.
PB-175 830 HC$3.00 MF$0.65

AN INVESTIGATION OF THE EFFECT OF HIGH TEMPERATURE ON THE SCHUMANN-RUNGE ULTRAVIOLET ABSORPTIONONTINUUM OF OXYGEN.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 7D.
PB-175 896 HC$3.00 MF$0.65

ESSA/SIDD LIBRARY BRANCH SURVEY.
Perreault (Jean) and Associates.
For primary bibliographic entry see Field 5B.
PB-175 962 HC$3.00 MF$0.65

TEMPERATURE CONTROL OF BALLOON PACKAGES.
Technical notes,
National Center for Atmospheric Research, Boulder, Colo.
Ernest W. Lichfield, and Neil E. Carlson. Aug 67, 45p NCAR-TN-32

Descriptors: (*Balloons, Temperature), (*Containers, *Thermal insulation), Control, Heat, Periodic variations, Electronic equipment, Thickness, Tests.

Since the electronics and battery power supply of the IRLS system will not operate properly at this temperature extreme, NASA issued a contract to NCAR to design a thermal package that would maintain the IRLS components at a reasonable temperature during both day and night and for a long period of time (several months). As we analyzed the problems we found that there was very little published information on temperature control for balloon flights. It was therefore decided that a report should be written that could be used as a general guide for thermal packaging for ballooning. (Author)
PB-176 089 HC$3.00 MF$0.65

4B. Meteorology

CBE FACTORS: MONTHLY SURVEY NO. 17.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-658 438 HC$3.00 MF$0.65

WIND AND TEMPERATURE PROFILES FROM PROJECT WINDY ACRES.
Special repts. no. 65.
Air Force Cambridge Research Labs L G Hanscom Field Mass
Jun 67, 163p Rept no. AFCRL-67-0339

Descriptors: (*Wind, *Meteorological parameters), (*Temperature, Meteorological parameters), Velocity, Anemometers, Sensors, Photographs, Boundary layer, Resolution, Data.
Identifiers: Wind profiles.

During an experimental program conducted in 1965 by the Boundary Layer Branch at AFCRL, data were collected in three continuous operations, each lasting approximately 12 hours. The data consist primarily of vertical profiles of wind, temperature and Richardson numbers in 15-min blocks covering periods from early evening to early morning. (Author)
AD-658 827 HC$3.00 MF$0.65

INFLUENCE OF SINGLE SCATTERING ALBEDO ON REFLECTED AND TRANSMITTED LIGHT FROM CLOUDS,
Southwest Center for Advanced Studies Dallas Tex
For primary bibliographic entry see Field 4A.
AD-658 830 HC$3.00 MF$0.65

AN ANALYSIS OF THE SYNOPTIC PROCESSES DURING THE EASTWARD MOVEMENT OF TROUGHS IN THE SOUTHERN BRANCH OF THE UPPER WESTERLIES ABOVE A CUSHION OF COLD AIR OVER SOUTH CHINA IN SPRING.
Research trans.,
Emmanuel Coll Boston Mass Oriental Science Library
Hsu Tsih-Hsiu, and Wang Mu-Wei. Jul 67, 24p Rept no. Emm-66-139
TT-67-62941
Contract AF 19 (628)-5073
Trans. of Ch'i Hsiang Hsueh Pao (Chinese People's Republic), v35 n2 p117-25 1965.

Descriptors: (*Weather forecasting, China), Periodic variations, Surface properties, Troposphere, Pressure, Meteorological parameters, Climatology, Motion, Thunderstorms.

After the intrusion of cold air into South China in spring a thin layer of cold air often prevails over the east of the Tibetan Plateau, forming a 'cushion of cold air'. When zonal circulation dominates the upper troposphere, troughs over the 'cold cushion' tend to move eastward along the southern branch of the upper westerly jet. Under such circumstances, the high pressure area at the surface tends to break up to make way for frontogenesis and the development of surface troughs. The present study deals with such synoptic processes over South China for the months of March to May during 1958 - 1962. Problems on short-range prediction of precipitation and thunderstorm activities associated with these processes are also discussed. (Author)
AD-658 843 HC$3.00 MF$0.65

A STUDY OF THE THERMAL LOW OVER SOUTHWEST CHINA AND RELATED FORECASTING PROBLEMS.
Research trans.,
Emmanuel Coll Boston Mass Oriental Science Library
Li Guo-Wen. Jul 67, 19p Rept no. Emm-66-141
TT-67-62942
Contract AF 19 (628)-5073
Trans. of Ch'i Hsiang Hsueh Pao (Chinese People's Republic), v35 n2 p126-31 1965.

Descriptors: (*Weather forecasting, China), Periodic variations, Temperature, Wind, Humidity, Visibility, Meteorological parameters.

The thermal low which develops near the Szechwan basin is an important synoptic system exerting a pronounced influence on the weather over Southwest China in spring. The affected region is characterized by high temperatures, low humidity, fine weather with good visibility and a marked intensification of southerly winds. In addition, strong southerlies often prevail over western Kweichow and northern Yunnan. The dissipation of this type of thermal low usually brings precipitation and a fall of air temperature in the Szechwan-Kweichow region. The present study reveals the relationship

between the thermal low and the upper vortex which appears at the 700-mb level over Southwest China above the thermal low prior to its maximum development. However, about 24-36 hours after its birth the 700-mb vortex usually moves eastward under the influence of a 500-mb trough in the upper westerlies, and the surface thermal low then begins to fill up. This paper summarizes the empirical rules governing the formation and development of the thermal low. Empirical predictors to forecast the growth and dissipation of the thermal low are derived from changes of meteorological elements at Kweiyang as plotted on synoptic charts. (Author)
AD-658 844 HC$3.00 MF$0.65

EFFECT OF POINT ARGUELLO WIND VARIABILITY UPON RANGE SAFETY CONSIDERATIONS AT WTR.
Aerospace Corp El Segundo Calif El Segundo Technical Operations
For primary bibliographic entry see Field 16A.
AD-658 847 HC$3.00 MF$0.65

A DIGITAL AIRBORNE METEOROLOGICAL DATA COLLECTION SYSTEM,
Dayton Univ Ohio Research Inst
Donald A. Kahle. Jun 67, 54p Rept no. Scientific-1, UDRI-TR-67-128
AFCRL-67-0420
Contract F-19628-67-C-0101

Descriptors: (*Meteorological parameters, *Data processing systems), Airborne, Digital computers, Accuracy, Maintenance, Costs, Magnetic tape, Sampling, Analysis, Meteorology, Recording systems, Operation.

The report presents the results of a study of data collection means for an airborne meteorological data collection project conducted by the Meteorology Laboratory of the Air Force Cambridge Research Laboratories. Recording media, recording techniques, automation of data processing, time required for processing, and cost of the final data are some of the considerations investigated in the study. To fulfill the particular requirement that prompted this study, a digital magnetic tape recording system is proposed and described in detail. (Author)
AD-658 865 HC$3.00 MF$0.65

AN INVESTIGATION OF LOW VISIBILITY DURING JANUARY AND FEBRUARY AT SUFFOLK COUNTY AIR FORCE BASE,
Weather Squadron (12) Suffolk County AFB N Y Detachment 9
Sydney M. Cohen. 12 Jun 67, 22p

Descriptors: (*Visibility, Airports), New York, Dew point, Wind, Clouds, Barometric pressure, Graphics, Weather forecasting.

The investigation of conditions leading to low visibility at Suffolk County AFB (FOK) during January and February was approached in four ways. This paper defines deterioration as a decrease in visibility to four miles or less. Likewise, low visibility is a visibility of four miles or less. The first approach was accomplished by graphically plotting the dew point depression as a function of cloud cover at sunset. The only conclusion was that when the depression is 8F or less, regardless of cloud cover, the probability for low visibility in the next several hours is 80.7%. The second approach involved an analysis of cloud cover as a function of dew point depression for both six and three hours prior to the recorded low visibility. For the same times an analysis was also made of wind direction vs. dew point depressions. The final approach was a study of the relationship between low visibility and the preceeding local pressure changes. (Author)
AD-658 889 HC$3.00 MF$0.65

HAIL INCIDENCE IN THE TROPICS.
Revised ed.,
Raven Industries Inc Sioux Falls S Dak
E. M. Frisby, and H. W. Sansom. 24 Oct 66, 16p
Prepared in cooperation with East African Meteorological Dept., Nairobi, Kenya. Revision of manuscript submitted 23 May 66.
Availability: Published in Journal of Applied Meteorology v6 n2 p339-54 Apr 1967.

Descriptors: (*Hail, Tropical regions), Meteorological phenomena, Periodic variations, Climatology, Mountains, Tables.

The paper is a review and compilation of information concerning the incidence and frequency of hail fall in tropical areas. The authors have gathered the data over a period of years from literary sources and by extensive correspondence with private individuals and government meteorological services. The four areas under which the various hail reports are grouped, viz., the American, African, Asian, and Australian, together form a total band around the Earth within latitudes 23 1/2 degrees north and south of the equator. Attempts have been made to systematize presentation of the information. This is possible only up to a point, however, since it was received in a multiplicity of forms, some of which defy conventional climatological handling. Nevertheless, the paper makes possible for the first time a comprehensive assessment of the tropical hail phenomenon. Moreover, a great deal can be learned from it about seasonality of hail fall in specific areas and about the occurrence of hail at sea level and over the sea, facts which have been in question up to this time. (Author)
AD-658 948 Not available from CFSTI.

EXPERIMENTS ON EKMAN LAYER INSTABILITY,
Massachusetts Inst of Tech Cambridge Dept of Meteorology
P. R. Tatro, and E. L. Mollo-Christensen. 5 Jul 66, 13p
Grant NsG-496
Availability: Published in J. Fluid Mech. v28 pt3 p531-43 1967.

Descriptors: (*Boundary layer, Stability), (*Marine meteorology, Boundary layer), Reynolds number, Drag, Coriolis effect, Vortices, Anemometers.
Identifiers: Ekman layer.

Laboratory measurements were made of the instabilities of the Ekman layer using hot wire anemometers. The apparatus consisted of two parallel circular rotating plates forming a spool; the air was admitted through screens at the outer edge and removed through a screen cage at the hub. In the Ekman layers formed on the inner surfaces of the plates, measurements were made of the mean velocities as functions of r and a; the velocity fluctuations were also measured. It appears that the instability labelled type II by Faller always occurs first, and at zero Rossby number the critical Reynolds number is 56 plus or minus 2. This instability originates in the boundary layer, but at slightly higher Reynolds number the fluctuations persist far into the geostrophic region, probably as inertial waves excited by the boundary-layer fluctuations. At higher Reynolds number another instability appears of shorter wavelength and slower speed. This instability is confined to the boundary layer and is apparently the type I reported by Faller. The phase speeds, frequencies, and wave-front orientations of both type instabilities were measured. (Author)
AD-658 952 Not available from CFSTI.

ON THE USE AND MISUSE OF THE BRIER VERIFICATION SCORE.
Technical memo.,
Weather Bureau, Kansas City, Mo. Central Region.
Lawrence A. Hughes. Aug 67, 17p WBTM-CR-18

Descriptors: (*Atmospheric precipitation, *Weather forecasting), Probability, Rain, Reliability, Mathematical analysis.
Identifiers: Brier verification score.

The ESSA Weather Bureau has been verifying its precipitation probability forecasts with a form of the Brier (1950) score since these forecasts have been made. The main advantage of this scoring system is the fact that the system cannot be 'played' by the forecaster, i.e., a good forecaster tends to get a poorer score if he uses a probability other than the one he believes appropriate to the weather situation without consideration of the scoring system. This has been stated by Sanders (1963), reiterated by Hughes (1965), and proven by Murphy and Epstein (196-). There are a number of 'hedging' systems that have been tried and proven wanting, and several of these will be discussed. In addition, some people advocate elimination of the squaring function in the score and use of the first power. This aspect of the score will also be discussed. (Author)
PB-175 771 HC$3.00 MF$0.65

A METHOD FOR DERIVING PREDICTIONS OF SOIL TEMPERATURE FROM MEDIUM-RANGE WEATHER FORECASTS.
Weather Bureau, Silver Spring, Md. Weather Analysis and Prediction Div.
For primary bibliographic entry see Field 8M.
PB-175 773 HC$3.00 MF$0.65

ON THE CONTINUITY OF WATER SUBSTANCE.
Technical memo.,
National Severe Storm Lab., Norman, Okla.
Edwin Kessler. Apr 67, 142p IERTM-NSSL-33

Descriptors: (*Atmospheric precipitation, *Clouds), (*Atmospheric condensation, Evaporation), Artificial precipitation, Drops, Particle size, Distribution, Rainfall, Atmospheric motion, Meteorological radar, Radar echo areas, Wind, Water, Radar reflections.

Four papers are presented here. In the first, principles of continuity are applied with simple models of airflows and microphysical processes. Associations among the distributions of water substance, the microphysical processes, and the air motion are described. The second short note discusses the gravitational separation of raindrops of different sizes. The third paper presents an interpretation of radar weather data, based on the theory discussed in the first paper. The last is a reprint of a paper first published in the Monthly Weather Review. This is included for readers who may wish to have convenient access to background for the first paper and to discussion of some related topics not given elsewhere.
PB-175 840 HC$3.00 MF$0.65

A TAPE PROGRAMMED SEQUENTIAL SAMPLER,
National Center for Atmospheric Research, Boulder, Colo.
A. David Gibson. 1967, 4p
Contract NSF-C-460

Descriptors: (*Samplers, *Control systems), (*Meteorological instruments, Samplers), Gas filters, Automatic, Synchros, Tapes.

A description is given of an atmospheric particle sampler which is designed to achieve greater reliability than those currently available through the use of a sequencing mechanism employing a perforated plastic tape and a synchronous motor timer.
PB-175 925 HC$3.00 MF$0.65

RELIABILITY OF CAN-TYPE PRECIPITATION GAGE MEASUREMENTS.
Technical rept.,
Utah Water Research Lab., Logan.
C. Earl Israelsen. Jul 67, 77p TR-2
Contract DI-14-06-D-6003
A State-of-the-Science Study.

Descriptors: (*Atmospheric precipitation, Measurement), (*Meters, Atmospheric precipitation), Accuracy, Mountains, Errors, Bibliographies.

A comprehensive review of literature was made of studies conducted since 1952 pertaining to the accuracy of can-type precipitation gage measurements. Brief discussions are given of the results of some of them, and conclusions are drawn. Topics discussed include raingage comparisons, accuracy of precipitation measurements, precipitation gage errors, and precipitation measurements in mountains. A bibliography is included. (Author)
PB-175 934 HC$3.00 MF$0.65

ESSA/SIDD LIBRARY BRANCH SURVEY.
Perreault (Jean) and Associates.
For primary bibliographic entry see Field 5B.
PB-175 962 HC$3.00 MF$0.65

THE DATA TAPE SYSTEM AND CONTENTS OF DATA TAPES 3 AND 4,
Hawaii Inst. of Geophysics, Honolulu.
Motoyasu Miyata, and Gordon W. Groves. Mar 67, 42p HIG-67-6, Data rept-4
Grant NSF-GP-4254
See also PB-174 105.

Descriptors: (*Magnetic tape, Data storage systems), (*Meteorological parameters, Data), Pacific Ocean islands, Hawaii, Weather stations, Tides, Barometric pressure, Wind.

This index is a continuation of 'The Data Tape System and Contents of Data Tape 2' Data Report No. 2, Hawaii Institute of Geophysics, 66-17 October 1966. The purpose is to make known certain series of sea-level and weather data which are now stored in the Institute on magnetic tape in convenient format. A general description of the format is given, as well as a catalog of the series on data tapes 3 and 4 and a combined index of series on data tapes 1 through 5. A sixth data tape is currently under preparation. (Author)
PB-175 964 HC$3.00 MF$0.65

A CENSUS OF CIRRUS HEIGHTS AND TEMPERATURES OVER CENTRAL UNITED STATES,
Chicago Univ., Ill. Cloud Physics Lab.
Edward L. Harrington. 15 Aug 67, 16p
Grants NSF-G-8214, NSF-GP-3779
Presented at the Conference of the American Meteorological Society on Physical Processes in the Lower Atmosphere, 20 Mar 67, Ann Arbor, Mich.

Descriptors: (*Cirrus clouds, Height finding), (*Atmospheric temperature, Upper atmosphere), Cumulus clouds, Ice, Crystals, Sampling, Troposphere, Tropopause, Thunderstorms, Missouri, Minnesota.

The height of cirrus having its origin in the dynamic processes and high-level convective processes of the atmosphere is intimately associated with tropopause height. Latitudinal variation in cirrus height is then explained by the latitudinal variation of tropopause height. There are important relationships between cirrus height and synoptic patterns which we have examined here only implicitly and superficially. During the summer months however a large fraction of cirrus, maybe as much as a third or a half, originates from convective processes in the lower atmosphere. Cirrus originating in this way may be found throughout a much deeper layer of the atmosphere than cirrus of conventional origin. (Author)
PB-175 991 HC$3.00 MF$0.65

DEPTHS AND TEMPERATURES OF CONTINENTAL CONVECTIVE CLOUDS AT THE TIME OF INITIAL PRECIPITATION ECHO,
Chicago Univ., Ill. Cloud Physics Lab.
Edward L. Harrington. 15 Aug 67, 11p
Grants NSF-G-8214, NSF-GP-3779
Presented at the National Meeting of the American Meteorological Society (268th), 18 Apr 67, Washington, D. C.

Descriptors: (*Convection (Atmospheric), Clouds), (*Atmospheric precipitation, Meteorological radar), Missouri, Thunderstorms, Sampling, Atmospheric temperature, Radar echo areas.

Summer convective clouds in South Central Missouri most frequently initiate precipitation by the condensation-coalescence process. This is true even in regions of intense, concentrated convective activity where thunderstorms are likely to develop, unless updrafts are strong enough to carry cloud drops to regions cold enough for the Bergeron process before cloud drops can grow to precipitation size by coalescence. Clouds whose maximum depths exceed 18000 ft have a high probability of producing, by coalescence, precipitation-size particles in concentrations large enough to be detected by radar. In order to arrive at a significant value of this probability we shall have to increase our sample of first echo clouds, which we hope to do. (Author)
PB-175 992 HC$3.00 MF$0.65

THE SYNOPTICS, DYNAMICS AND ENERGETICS OF THE TEMPORAL USING SATELLITE RADIATION DATA (IN ADDITION TO CONVENTIONAL OBSERVATIONS).
Final rept. for 1st year,
Saint Louis Univ., Mo. Dept. of Geophysics.
Albert J. Pallmann, and Clifford J. Murino. Jul 67, 104p
Grant Cwb-WBG-89

Descriptors: (*Tropical cyclones, Central America), (*Meteorological satellites, Tropical cyclones), Atmospheric motion, Pacific Ocean, Meteorological charts, Atmospheric temperature, Barometric pressure, Cloud cover, Solar radiation, Thermodynamics, Wind, Air mass analysis.

Presents the first year's scientific findings from research on the synoptics and dynamics of the temporal occurrence of 5 - 10 November 1963. Particular emphasis is placed on the 24-hour period centering on the time of maximum development of the storm, 7 November 1963. The research methodology involved the careful interlocking of the precise rectification of TIROS VII radiation data with conventional analyses of the thermodynamic and kinematic fields. Special care was taken of the upper air raw wind data by means of an appropriate smoothing technique. Recent investigations proved the combined Fourier-least squares approximation to be the most fitting method for determining representative wind profiles.
PB-175 996 HC$3.00 MF$0.65

STUDIES IN ATMOSPHERIC ENERGETICS BASED ON AEROSPACE PROBINGS.
Annual rept. for 1966,
Wisconsin Univ., Madison. Dept. of Meteorology.
Verner E. Suomi. Mar 67, 134p
Grant Cwb-WBG-27
Prepared in cooperation with Santa Barbara Research Center.

Descriptors: (*Meteorological satellites, *Atmospheric motion), Calibration, Cameras, Solar radiation, Turbulence, Radiosondes, Dynamics, Data processing systems, Digital systems, Meteorological instruments, Heat transfer, Cloud cover, Reflectivity.

Contents: ATS spin-scan cloud camera and prelaunch calibration procedure; The reflection of sunlight to space and the absorption by the earth and atmosphere over the United States during Spring, 1962; The albedo of a striated plane parallel turbid medium; The theoretical basis for low-resolution radiometer measurements from a satellite; The 'chirp' digital radiosonde; The prototype data logging system for the ESSA III flat-plate radiometers; The prototype flat plate radiometers for the ESSA III satellite.
PB-175 997 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF PARAGUAY,
Weather Bureau, Washington, D. C.
Virgilio Torres-Rentas. May 66, 42p WB/BC-91
Sponsored by Air Weather Service Environmental Technical Applications Ctr., USAF, Washington, D. C.

Descriptors: (*South America, Climatology), (*Climatology, Bibliographies), Air mass analysis, Upper atmosphere, Atmospheric motion, Cloud cover, Atmospheric precipitation, Rainfall, Humidity, Atmospheric temperature, Wind.

The bibliography on the climate of Paraguay has been compiled from sources in various libraries of the Washington Metropolitan Area. Some sources may be in more than one of these libraries, however, the call number is recorded in the abstract for only one of them in the preferential order listed below: U. S. weather bureau library, Library of Congress, National Agriculture library, U. S. Geological Survey library, U. S. Naval Oceanographic library, Pan American Union library. (Author)
PB-175 999 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF THE REPUBLIC OF VIETNAM,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Mar 66, 130p WB/BC-90
Sponsored by Air Weather Service Environmental Technical Applications Ctr., USAF, Washington, D. C.

Descriptors: (*Vietnam, Climatology), (*Climatology, Bibliographies), Air mass analysis, Upper atmosphere, Atmospheric motion, Cloud cover, Atmospheric precipitation, Atmospheric temperature, Humidity, Rainfall, Wind.

The bibliography on the climate of the Republic of Vietnam has been compiled from sources in various libraries of the Washington Metropolitan Area. Some sources may be in more than one of these libraries, however, the call number is recorded in the abstract for only one of them in the preferential order listed below: U. S. Weather Bureau Library, Library of Congress, National Agriculture Library, U. S. Naval Oceanographic Library. (Author)
PB-176 000 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF MONGOLIA,
Weather Bureau, Washington, D. C.
J. Allen Wallace, Jr. Dec 65, 17p WB/BC-89
Sponsored by Air Weather Service Environmental Technical Applications Ctr., USAF, Washington, D. C.

Descriptors: (*China, Climatology), (*Climatology, Bibliographies), Atmospheric temperature, Clouds, Atmospheric precipitation, Wind, Barometric pressure, Weather stations, Humidity, Snow, Rain, Fog.
Identifiers: Mongolia.

This annotated bibliography consists of sources on various aspects of Mongolian climate covering the period 1895 to the present time. All available sources in the U. S. Department of Commerce, Environmental Science Services Administration, Weather Bureau Library, Washington, D. C., and Library of Congress, Washington, D.C., were examined and abstracted. To facilitate the location of these sources in these libraries the call numbers of the sources are given at the end of the entry.
PB-176 001 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF NORTH VIETNAM,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Jul 65, 94p WB/BC-88
Sponsored by Air Weather Service Environmental Technical Applications Ctr, USAF, Washington, D. C.

Descriptors: (*Vietnam, Climatology), (*Climatology, Bibliographies), Air mass analysis, Upper atmosphere, Atmospheric motion, Atmospheric precipitation, Atmospheric temperature, Humidity, Rainfall, Wind, Cloud cover.

The bibliography on the climate of North Vietnam has been compiled from sources in various libraries of the Washington Metropolitan Area. Some sources may be in more than one of these libraries, however the call number is recorded in the abstract for only one of them in the preferential order listed below: U. S. Weather Bureau library, Library of Congress, National Agriculture library, U. S. Naval Oceanographic library, U. S. Bureau of Census. (Author)
PB-176 002 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF HAITI,
Weather Bureau, Washington, D. C.
Simon J. Roman. Jul 66, 21p WB/BC-93
Sponsored by Air Weather Service. Environmental Technical Applications Ctr, USAF, Washington, D. C.

Descriptors: (*Haiti, Climatology), (*Climatology, Bibliographies), Air mass analysis, Upper atmosphere, Atmospheric motion, Cloud cover, Atmospheric precipitation, Atmospheric temperature.

The bibliography consists of sources containing meteorological and/or climatological data for Haiti. All available sources up to August 1963 in the U. S. Department of Commerce, Environmental Science Services Administration, Weather Bureau Library (DWB), Silver Spring, Maryland, and the Library of Congress (DLC), Washington, D. C., have been abstracted. (Author)
PB-176 003 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF LEBANON,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Nov 61, 45p WB/BC-50
Research supported in part by Air Weather Service Climatic Center, Washington, D. C.

Descriptors: (*Lebanon, Climatology), (*Climatology, Bibliographies), Cloud cover, Humidity, Atmospheric precipitation, Atmospheric temperature, Wind, Air mass analysis, Atmospheric motion.

The bibliography is compiled from sources in the Weather Bureau Library, Library of Congress, Geological Survey Library, National Library of Medicine, Department of Agriculture Library, Census Library and Middle East Institute Library. Map scales determined by means of a map scale indicator are enclosed in half brackets as 1:1 700 000. (Author)
PB-176 004 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON CLIMATIC MAPS OF LEBANON,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Dec 60, 14p WB/BM-14
Research supported in part by Air Weather Service Climatic Center, Washington, D. C.

Descriptors: (*Lebanon, Climatology), (*Meteorological charts, Bibliographies), Atmospheric precipitation, Rainfall, Wind, Atmospheric temperature, Clouds, Barometric pressure, Air mass analysis, Abstracts.

The bibliography is compiled from available sources in the Weather Bureau Library, the Library of Congress, the Geological Survey Library, the National Library of Medicine, the Department of Agriculture Library and the Middle East Institute Library. It consists of sources containing climatic maps of Lebanon and the following areas which include Lebanon and Syria, the Near East, southwest Asia, southwest Asia and northeast Africa, the Middle East and the Levant. Map scales have been recorded in the abstracts. In the absence of printed information the scales have been determined by use of a map scale indicator and these approximate values have been enclosed in brackets. (Author)
PB-176 005 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS FOR AUSTRALIA,
Weather Bureau, Washington, D. C.
Vincent J. Creasi. Jan 60, 44p WB/BM-16
Sponsored by the Air Weather Service Climatic Center, USAF, Washington, D. C.

Descriptors: (*Australia, *Climatology), (*Meteorological charts, Bibliographies), Air mass analysis, Clouds, Cyclones, Anticyclones, Earthquakes, Floods, Fog, Tropical cyclones, Humidity, Ocean currents, Ice, Rain, Hail, Wind, Thunderstorms.

The document lists 86 reports by title and author, and includes descriptive comments concerning the contents of these reports.
PB-176 007 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF TURKEY (SECONDARY),
Weather Bureau, Washington, D. C.
A. Delbert Peterson, and Nina A. Stepanova. Jul 57, 24p WB/BC-34
Sponsored by the Air Weather Service Climatic Center, USAF, Washington, D. C.

Descriptors: (*Turkey, Climatology), (*Climatology, Bibliographies), Weather stations, Atmospheric motion, Atmospheric precipitation, Air mass analysis, Upper atmosphere.

The secondary survey of climatic maps of Turkey gives a listing of sources by Subject heading as well as a listing by Author - Title. (Author)
PB-176 008 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY OF CLIMATIC MAPS FOR NIGERIA AND THE BRITISH CAMEROONS,
Weather Bureau, Washington, D. C.
Thomas A. Bender, Jr. Jan 60, 18p WB/BC-24
Sponsored by the Air Weather Service Climatic Center, USAF, Washington, D. C.

Descriptors: (*Nigeria, Climatology), (*Meteorological charts, Bibliographies), Atmospheric precipitation, Atmospheric temperature, Wind, Rainfall, Humidity.

The survey of climatic maps covers the combined areas of Nigeria and the British Cameroons. Easily the most significant, concise and recent source to be included in this bibliography is No. 5, 'The Land and People of Nigeria.' The reference just mentioned contains an extensive series of well prepared maps that portray in a thorough manner the climate of this country. Two sources relating to the larger area of West Africa have also been included because of their meteorological importance to the region. No. 6, 'West African Weather Patterns' by Chancellor, concerns the harmattan haze while No. 11, Sur un nouvel indice climatique d'humidite propose pour l'Afrique occidentale' by Hiernaux, applies a newly developed humidity index to this section of the African continent. (Author)
PB-176 009 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON CLIMATIC MAPS OF THE NETHERLANDS,
Weather Bureau, Washington, D. C.
Annie E. Grimes, and Marie L. Weight. Jan 61, 11p WB/BM-29
Sponsored by the Air Weather Service Climatic Center, USAF, Washington, D. C.

Descriptors: (*Netherlands, *Climatology), (*Meteorological charts, Bibliographies), Atmospheric precipitation, Atmospheric temperature, Cloud cover, Wind, Barometric pressure.

The bibliography consists of annotated sources available in the Library of Congress, the Department of Agriculture Library and the Weather Bureau Library. Map scales have been recorded in the abstracts. However, in the absence of printed information the scales have been determined by use of a map scale indicator and these approximate values have been enclosed in brackets, as (1:6 000 000). (Author)
PB-176 010 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON CLIMATIC MAPS OF LIBYA,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Jul 61, 9p WB/BM-28
Sponsored by the Air Weather Service Climatic Center, USAF, Washington, D. C.

Descriptors: (*Libya, *Climatology), (*Meteorological charts, Bibliographies), Atmospheric precipitation, Cloud cover, Atmospheric temperature, Wind, Air mass analysis.

The bibliography is compiled from available sources in the Weather Bureau Library, Library of Congress and Census Library. It consists of sources which contain climatic maps of Libya, sections of Libya and portions of the Mediterranean region which include Libya. Map scales have been recorded in the abstracts. In the absence of printed information the scales have been determined by use of a map scale indicator and these approximate values have been enclosed in brackets. (Author)
PB-176 011 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY OF CLIMATIC MAPS ON CUBA,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Apr 61, 10p WB/BM-27
Sponsored by the Air Weather Service Climatic Center, USAF, Washington, D. C.

Descriptors: (*Cuba, *Climatology), (*Meteorological charts, Bibliographies), Tropical cyclones, Atmospheric precipitation, Rainfall, Wind, Clouds, Atmospheric temperature.

The bibliography has been compiled from sources in the U. S. Weather Bureau Library, the Library of Congress, the Geological Survey Library and the Hydrographic Office Library. It consists of sources containing climatic maps of Cuba. Map scales have been recorded in the abstract. In the absence of printed information the natural scales have been determined by use of a map scale indicator. If the map has graticules or graphic linear scale the ascertained natural scale is placed in brackets. However, if the climatic data are presented on a

sketch map the estimated natural scale is placed in parenthesis, as (scale is not indicated (about 1:10 000 000)). (Author)
PB-176 012 HC$3.00 MF$0.65

ANNOTATED BIBLIOGRAPHY OF THE CLIMATE OF THE CAUCASUS,
Weather Bureau, Washington, D. C.
Nina A. Stepanova. Dec 60, 46p WB/BC-43
Research supported in part by Air Weather Service Climatic Center, Washington, D. C.

Descriptors: (*USSR, Climatology), (*Climatology, Bibliographies), Atmospheric motion, Air mass analysis, Atmospheric precipitation, Clouds, Rainfall, Cloud cover, Wind.

The bibliography includes most of the material on various aspects of the Caucasus climate covering the period 1866-1960. The initials DWB, DLC, DA (FAS), at the end of the entry title stand for the Weather Bureau Library, Library of Congress, Library of the Department of Agriculture and the Foreign Area Section (Office of Climatology, U. S. Weather Bureau). To facilitate the location of these sources in these libraries the call numbers of the books are given at the end of the entry. A detailed index to authors, various elements of climate, and to publication years will be found at the end of this publication. (Author)
PB-176 013 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY OF CLIMATIC MAPS FOR FINLAND,
Weather Bureau, Washington, D. C.
Vincent J. Creasi, and Nina A. Stepanova. May 60, 29p WB/BM-22
Research supported in part by Air Weather Service Climatic Center, Washington, D. C.

Descriptors: (*Finland, *Climatology), (*Meteorological charts, Bibliographies), Atmospheric precipitation, Rainfall, Snow, Atmospheric temperature, Barometric pressure.

Only climatic maps, with elements summarized over a period, were selected for annotation. Further, the period from 1930 to the termination date was emphasized in the selection of sources. The initials DWB, DLC, DN-HO and Census used in the abstract titles refer to the Weather Bureau Library, the Library of Congress. the U. S. Navy Hydrographic Office Library and the Census Bureau Library all in Washington, D. C. All scales with brackets are measured with a natural scale indicator from maps with parallels on them. All scales without brackets are given on the climatic maps or a legend scale provided from which a map scale can be obtained. On maps without parallels, latitude lines were estimated and a natural map scale used to obtain a map scale. (Author)
PB-176 014 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY ON THE CLIMATE OF THE SOUTH PACIFIC ISLANDS,
Weather Bureau, Washington, D. C.
Harold K. Gold, and Thomas A. Bender, Jr. Mar 60, 48p WB/BC-47
Research supported in part by Air Weather Service, Washington, D. C.

Descriptors: (*Pacific Ocean Islands, Climatology), (*Climatology, Bibliographies), Visibility, Cloud cover, Ocean currents, Air mass analysis, Barometric pressure, Atmospheric precipitation, Lightning, Wind, Humidity, Atmospheric temperature, Thunderstorms, Fog, Hail, Tropical cyclones.

The document lists 113 reports by author and title, and includes descriptive comments concerning the contents of these reports. The core area for this survey is bounded by and includes the following islands and groups: French Oceania Phoenix, Tokelau, Samoa, Cook, Line, Pitcairn, Manihiki and adjacent British Islands. Sources with better than average coverage in this region are listed. The termination date for the search for sources was December, 1959.
PB-176 015 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY ON THE CLIMATE OF NORWAY,
Weather Bureau, Washington, D. C.
Vincent J. Creasi. Sep 60, 58p WB/BC-46
Sponsored by the Air Weather Service Climatic Center, USAF, Washington, D. C.

Descriptors: (*Norway, Climatology), (*Climatology, Bibliographies), Weather stations, Cloud cover, Atmospheric precipitation, Humidity, Atmospheric temperature, Wind, Visibility.

Mainly sources with climatic data, summarized over a period, were selected for the bibliography. In addition, the years from 1940 to the termination date (April 15, 1960) were emphasized in choosing sources. The initials DWB, DLC and DN-HO sed in the abstract titles refer to the Weather Bureau Library, the Library of Congress and the U.S. Navy Hydrographic Office Library all in Washington, D. C. Preparation of these abstracts was done in the Foreign Area Section of the Office of Climatology. All scales with brackets are measured with a natural map scale indicator from maps with latitude lines and are only an estimation. Those scales without brackets in the abstracts are given on the climate maps or a legend scale provided. On maps without parallels, latitude lines were estimated and a natural map scale used to obtain an approximate map scale; these are indicated by parenthesis. (Author)
PB-176 016 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF THE ARABIAN PENINSULA,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Dec 60, 42p WB/BC-42
Sponsored by the Air Weather Service Climatic Center, USAF, Washington, D. C.

Descriptors: (*Arabia, Climatology), (*Climatology, Bibliographies), Cloud cover, Atmospheric precipitation, Humidity, Barometric pressure, Atmospheric temperature, Wind, Air mass analysis, Upper atmosphere.

The bibliography consists of sources containing meteorological and climatological data for the Arabian Peninsula. This peninsula includes Saudi Arabia, Kuwait, Qatar, Yemen, Oman, Trucial Oman, Aden Colony and Aden Protectorate. Sources available in the Middle East Library, the Library of Congress, the Department of Agriculture Library, and the Weather Bureau Library have been annotated. The map scale with brackets, indicates that the value has been estimated by use of a map scale indicator. (Author)
PB-176 017 HC$3.00 MF$0.65

SUPPLEMENTARY BIBLIOGRAPHY ON THE CLIMATE OF GERMANY 1950-1957,
Weather Bureau, Washington, D. C.
Nina A. Stepanova, and Angelo F. Spano. Feb 58, 19p WB/BC-41
Research supported in part by Air Weather Service, Washington, D. C.

Descriptors: (*West Germany, Climatology), (*East Germany, Climatology), (*Climatology, Bibliographies), Cloud cover, Wind, Atmospheric temperature, Mountains, Atmospheric motion, Diurnal variations, Humidity, Air mass analysis, Ice, Sunspots, Barometric pressure, Atmospheric precipitation.

The document contains a listing of reports by title and author, and includes descriptive comments concerning the contents of these reports. This supplementary bibliography has only sources not included in Air Weather Service files and American Meteorological Society, Meteorological Abstracts and Bibliography.
PB-176 018 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF CUBA,
Weather Bureau of Washington, D. C.
Annie E. Grimes. Jul 58, 61p WB/BC-36
Sponsored by the Climatic Center, Air Weather Service, USAF, Washington, D. C.

Descriptors: (*Cuba, Climatology), (*Climatology, Bibliographies), Tropical cyclones, Weather stations, Atmospheric motion, Air mass analysis, Wind, Atmospheric precipitation.

Sources with abstracts are listed alphabetically in the following order: by author; by issuing office for periodicals or articles in serials with no author designated. Reports on cloud seeding activities are included in this bibliography. Photocopies of the precipitation summaries used by Wallace E. Howell Associates, Inc., in evaluating the cloud seeding results in Cuba are available at the U.S. Weather Bureau. Abstracts of articles on hurricanes crossing Cuba are included. The Marine Section of the U.S. Weather Bureau is making a study of the hurricanes in the North Atlantic, Caribbean, and Gulf of Mexico from 1887 to 1957. This study is to be published as a U.S. Weather Bureau Technical Paper. Monthly and annual climatic summaries over a period (period varies by station and element) are recorded on cards for selected stations in Cuba. These climatic data cards are in the files of the Foreign Area Section. (Author)
PB-176 019 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF CYPRUS,
Weather Bureau, Washington, D. C.
J. A. Wallace. Mar 58, 42p WB/BC-37
Sponsored by the Directorate of Climatology of the Air Weather Service, USAF, Washington, D. C.

Descriptors: (*Cyprus, Climatology), (*Climatology, Bibliographies), Air mass analysis, Atmospheric motion, Atmospheric temperature, Atmospheric precipitation, Rainfall, Wind.

The most comprehensive sourcesof summarized data are: Cyprus. Meteorological Observations, 1909-38; 1946-53; and Egypt. Ministry of Public Works, Physical Department Meteorological Report 1907-1939. Three comprehensive textual sources are: Notes on the climate of Cyprus; Climatology of Mediterranean Region; and U. S. Weather Bureau. Climate of Southwestern Asia. Current data appear in two U. S. publications: Daily Series, Synoptic Weather maps. Pt. II: Northern Hemisphere Data Tabulations. Daily Bulletin and Monthly Climatic Data for the World. A Great Britain publication Daily Weather Report - Overseas Supplement also contains current data. Abstracts found in 'Meteorological Abstracts and Bibliography' have been used where the information supplied was sufficient, or for works not available at the Library of Congress, or the U. S. Weather Bureau Library. (Author)
PB-176 020 HC$3.00 MF$0.65

BIBLIOGRAPHY ON CLIMATE OF MALTA AND GIBRALTAR,
Weather Bureau, Washington, D. C.
J. Allen Wallace, Jr. Jul 58, 55p WB/BC-39
Sponsored by the Directorate of Climatology of the Air Weather Service, USAF, Washington, D. C.

Descriptors: (*Gibraltar Strait, Climatology), (*Climatology, Bibliographies), Air mass analysis, Atmospheric precipitation, Air mass analysis, Atmospheric motion, Upper atmosphere, Wind, Rainfall.

Contents: Sources for both Malta and Gibraltar; Sources for Malta; Sources for Gibraltar; Sources in area of interest in the Mediterranean; Listing of publication dates; Alphabetical author listing; Listing of sources by classification number; Listing of sources by subject heading. (Author)
PB-176 021 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF INDOCHINA II,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Mar 58, 20p WB/BC-38
Sponsored by the Directorate of Climatology of the Air Weather Service, USAF, Washington, D. C.

Descriptors: (*Vietnam, Climatology), (*Climatology, Bibliographies), Weather stations, Upper atmosphere, Air mass analysis, Atmospheric motion, Wind, Barometric pressure, Clouds.

The report is a continuation of the Bibliography on the Climate of Indochina. Washington, June 1957. In Section I sources with climatic data for Indochina as a whole and those with climatological information for more than one state of Indochina are arranged alphabetically by author. Abstracts of publications with data for specific locations contain either the station name (or names) or the total number of stations in each state. Section II consists of abstracts of sources with climatic data for individual states of Indochina arranged alphabetically by author. (Author)
PB-176 022 HC$3.00 MF$0.65

SECONDARY BIBLIOGRAPHY ON THE CLIMATE OF IRAQ.
Weather Bureau, Washington, D. C.
1958, 14p WB/BC-35

Descriptors: (*Iraq, Climatology), (*Climatology, Bibliographies), Air mass analysis, Upper atmosphere, Atmospheric motion, Cloud cover, Rainfall, Atmospheric precipitation, Atmospheric temperature, Wind.

The secondary bibliography on the climate of Iraq, gives a listing of sources by author, and by subject heading. (Author)
PB-176 023 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF IRAN,
Weather Bureau, Washington, D. C.
A. Delbert Peterson. Jul 57, 28p WB/BC-31

Descriptors: (*Iran, Climatology), (*Climatology, Bibliographies), Atmospheric temperature, Atmospheric precipitation, Cloud cover, Rainfall, Wind, Air mass analysis.

Contents: Bibliography on the climate of Iran; (Listing by author - title, listing of sources by classification number, listing of sources by subject heading). Secondary bibliography on the climate of Iran; (Listing by author - title, listing of sources by classification number, listing of sources by subject heading). (Author)
PB-176 024 HC$3.00 MF$0.65

SUPPLEMENT TO THE BIBLIOGRAPHY ON THE CLIMATE OF GREENLAND,
Weather Bureau, Washington, D. C.
V. J. Creasi. Jun 58, 53p WB/BC-40
Research supported in part by Air Weather Service, Washington, D. C.

Descriptors: (*Greenland, Climatology), (*Climatology, Bibliographies), Air mass analysis, Atmospheric motion, Atmospheric temperature, Cloud cover, Upper atmosphere, Weather stations, Atmospheric precipitation.

The supplement consists of material published since the first 'Bibliography on the Climate of Greenland' (August 1957) with the exception of five sources 32 (1937), 33 (1930), 37 (1949), 57 (1939), 68 (1944). Most of the abstracts have been prepared by the Foreign Area Section and signed by the initials of the writer. Sources found in 'Meteorological Abstracts and Bibliography' (MAB), 'Arctic Bibliography' vol. 6-7 (AB), and 'Bibliography on Snow, Ice and Permafrost' SIPRE Report 12, vol. 11-12 (SIP) are so credited when used. These abstracts were used when information supplied was sufficient, source could not be obtained from local libraries, or time limitations intervened. The initial DWB, DLC, and DAWS were used in the source title for the Weather Bureau Library, The Library of Congress and the Air Weather Service Library. All items marked with an asterisk indicate that the source contains ice-cap data and all items marked with a plus sign indicate items containing mostly descriptive or theoretical information. The last six items are data survey abstracts which are included as sources 79 to 84 inclusive. (Authors)
PB-176 025 HC$3.00 MF$0.65

ANNOTATED BIBLIOGRAPHY OF CLIMATIC MAPS OF JORDAN,
Weather Bureau, Washington, D. C.
Darthula M. Carraway. Jan 61, 13p WB/BM-35
Research supported by Air Weather Service Climatic Center, Washington, D. C.

Descriptors: (*Jordan, *Climatology), (*Meteorological charts, Bibliographies), (*Middle East, Climatology), Mediterranean Sea, Israel, Dew, Humidity, Rain, Snow, Air mass analysis, Clouds, Fog, Barometric pressure, Thunderstorms, Wind.

This bibliography of climatic maps has been compiled from available sources in the Weather Bureau Library and the Department of Agriculture Library. Since very few maps of Jordan appear in the meteorological and climatological literature, the following geographic divisions which contain all or part of Jordan have also been included: The Middle East, Southwest Asia, eastern Mediterranean area, and the Near East. Many of the maps which are labeled Palestine are actually for Western Jordan and Israel according to present day geographical boundaries. Map scales are presented in the abstracts. In the absence of printed information the scales have been determined by a map scale indicator and these approximate values have been enclosed in sub-brackets.
PB-176 027 HC$3.00 MF$0.65

SELECTED ANNOTATED BIBLIOGRAPHY OF CLIMATIC MAPS FOR GREECE,
Weather Bureau, Washington, D. C.
Harold K. Gold. Apr 61, 22p WB/BM-37
Research supported by Air Weather Service Climatic Center, Washington, D. C.

Descriptors: (*Greece, *Climatology), (*Meteorological charts, Bibliographies), (*Mediterranean Sea, Climatology), Atmospheric motion, Barometric pressure, Wind, Atmospheric temperature, Humidity, Cloud cover, Hail, Fog, Atmospheric precipitation, Weather stations, Air mass analysis, Rainfall.

This annotated bibliography of climatic maps of Greece and the Greek Islands is compiled from selected sources found in the Weather Bureau Library and the Library of Congress. The majority of maps are for the Mediterranean region as a whole, but references with material pertaining primarily to Greece and nearby areas are listed. Map scales are given in the abstracts without qualification if furnished on the original maps; but where not so given, they are enclosed in brackets, if determined by use of a map scale indicator. Where latitude lines or other scales are missing on maps, making the determination uncertain, an approximation of the scale is supplied, it then being closed in parentheses. The search for sources was terminated February 1, 1961.
PB-176 028 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY OF CLIMATIC MAPS FOR THE WESTERN PACIFIC OCEAN,
Weather Bureau, Washington, D. C.
Thomas A. Bender, Jr., and Charles S. Vitale.
May 58, 28p WB/BM-8
Research supported by Air Weather Service, Washington, D. C.

Descriptors: (*Pacific Ocean Islands, Climatology), (*Meteorological charts, Bibliographies), (*Pacific Ocean, *Climatology), Marshall Islands, Air mass analysis, Tropical cyclones, Wind, Ocean currents, Fog, Humidity, Temperature inversion, Refractive index, Barometric pressure, Thunderstorms, Atmospheric temperature.

The document lists 47 sources and includes descriptive comments concerning the contents of these sources. The core area for this survey is bounded by and includes the following: Caroline, Marianas, Marshall and Palau Islands. This includes the islands east of the Philippines with the northernmost extent defined by Wake and Marcus.
PB-176 029 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS FOR ETHIOPIA, ERITREA, AND THE SOMALILANDS,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Dec 59, 13p WB/BM-17
Research supported by Air Weather Service Climatic Center, Washington, D. C.

Descriptors: (*Ethiopia, *Climatology), (*Africa, Climatology), (*Meteorological charts, Bibliographies), Cloud cover, Air mass analysis, Atmospheric precipitation, Barometric pressure, Atmospheric temperature, Humidity, Wind, Visibility.
Identifiers: Eritrea, Somalilands.

The bibliography of climatic maps of Ethiopia, Eritrea, and the Somalilands is compiled from sources in the Weather Bureau Library, the Library of Congress, and the Department of Agriculture Library. Map scales have been recorded in the abstracts. Thirty-nine reference sources are listed.
PB-176 030 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS OF INDOCHINA,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Oct 60, 22p WB/BM-18
Research supported by Air Weather Service Climatic Center, Washington, D. C.

Descriptors: (*Vietnam, *Climatology), (*Cambodia, Climatology), (*Laos, Climatology), (*Meteorological charts, Bibliographies), Ceiling, Clouds, Cyclones, Earthquakes, Air mass analysis, Fog, Haze, Visibility, Wind, Thunderstorms, Tropical cyclones, Atmospheric temperature, Atmospheric precipitation, Humidity, Weather stations.

The bibliography, consisting of sources with climatic maps of Indochina or particular regions of Indochina, has been compiled from available sources in the Weather Bureau Library, the Library of Congress and the Department of Agriculture Library. Map scales have been included in the abstracts. Fifty-nine reference sources are listed.
PB-176 031 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS OF MOROCCO,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Nov 60, 11p WB/BM-19
Research supported by Air Weather Service Climatic Center, Washington, D. C.

Descriptors: (*Morocco, *Climatology), (*Meteorological charts, Bibliographies), Weather stations, Rainfall, North Africa, Storms, Atmospheric temperature, Hail, Wind, Meteorological phenomena.

This bibliography, compiled from selected sources in the Weather Bureau Library and the Library of Congress, consists of sources containing climatic maps of Morocco (politically divided into French Morocco, Spanish Morocco and the International Zone of Tangier), sections of Morocco and Northwest Africa. Map scales have been recorded in the abstracts. In the absence of printed information the scales have been determined by use of a map scale indicator and these approximate values have been enclosed in brackets, as 1:10 800 000.
PB-176 032 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS OF TUNISIA,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Dec 60, 11p WB/BM-21
Research supported by Air Weather Service Climatic Center, Washington, D. C.

Descriptors: (*Tunisia, Climatology), (*Meteorological charts, Bibliographies), Soils, North Africa, Atmospheric precipitation, Rainfall, Atmospheric temperature, Wind, Hail, Dew point, Storms, Meteorological parameters.

The bibliography has been compiled from sources in the Weather Bureau Library, the Library of Congress and the Department of Agriculture Library. Sources containing climatic maps of Tunisia, of sections Tunisia, Northwest Africa and North Africa are included. Map scales are recorded in the abstracts; however, in the absence of the printed information the scales have been determined by use of a map scale indicator and these approximate values have been enclosed in brackets as 1:3 000 000.
PB-176 033 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF IRAQ.
Weather Bureau, Washington, D. C.
1958, 14p WB/BC-32

Descriptors: (*Iraq, Climatology), (*Climatology, Bibliographies), Weather stations, Upper atmosphere, Atmospheric motion, Atmospheric temperature, Atmospheric precipitation, Snow, Rainfall, Visibility, Humidity, Cloud cover, Wind, Air mass analysis.

The document lists 50 reports by author and title, and includes descriptive comments concerning the contents of these reports. Also included are comments by the compiler concerning his recommendations for best sources of information within the bibliography.
PB-176 035 HC$3.00 MF$0.65

BIBLIOGRAPHY ON CLIMATIC MAPS FOR FRANCE,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Jun 59, 12p WB/BM-10
Sponsored by the Air Weather Service Climatic Center, USAF, Washington, D. C.

Descriptors: (*France, *Climatology), (*Meteorological charts, Bibliographies), Barometric pressure, Wind, Thunderstorms, Atmospheric precipitation, Atmospheric temperature, Terrain, Fog, Cloud cover, Rainfall, Snow.
Identifiers: Corsica.

This bibliography, compiled from available sources in the Weather Bureau Library and the Library of Congress, consists of sources containing maps of France and Corsica. Map scales have been included in the abstracts.
PB-176 036 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY OF CLIMATIC MAPS FOR THE SOUTHWEST PACIFIC OCEAN,
Weather Bureau, Washington, D. C.
Charles S. Vitale, and Thomas A. Bender, Jr.
May 58, 31p WB/BM-7
Sponsored by the Directorate of Climatology of the Air Weather Service, USAF, Washington, D. C.

Descriptors: (*Pacific Ocean Islands, Climatology), (*Meteorological charts, Bibliographies), (*Pacific Ocean, *Climatology), New Guinea, Southern hemisphere, Cloud cover, Ocean currents, Humidity, Visibility, Air mass analysis, Barometric pressure, Rainfall, Atmospheric temperature, Tropical cyclones, Fog.

The document lists 64 references and includes descriptive comments concerning the contents of each reference. The core area for this survey is bounded by and includes the following: Eastern half of New Guinea, Admiralty Islands, Gilbert Islands, Ellice Islands, Samoa Islands, Friendly Islands, (not Sunday or Kermadec Islands) New Caledonia, and Chesterfield Islands (not Willis Island).
PB-176 037 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS FOR IRAQ,
Weather Bureau, Washington, D. C.
S. J. Roman. May 58, 19p WB/BM-5
Sponsored by the Directorate of Climatology of the Air Weather Service, USAF, Washington, D. C.

Descriptors: (*Iraq, *Climatology), (*Meteorological charts, Bibliographies), Rainfall, Israel, Atmospheric precipitation, Barometric pressure, Air mass analysis, Wind, Atmospheric temperature, Snow, Thunderstorms, Meteorological phenomena.

The majority of the sources reviewed contain maps, not for Iraq alone, but for the Near or Middle East. However, maps for some countries, as India, Iran, Israel and Turkey, overlap and include all parts of Iraq. Some of the more comprehensive sources are noted.
PB-176 038 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS FOR IRELAND,
Weather Bureau, Washington, D. C.
Vincent J. Creasi, and Thomas A. Bender. 1957, 11p WB/BM-3

Descriptors: (*Eire, *Climatology), (*Meteorological charts, Bibliographies), (*Great Britain, Climatology), Atmospheric temperature, Rainfall, Wind, Snow, Thunderstorms, Barometric pressure, Humidity, Fog, Cloud cover, Visibility.

The document lists 34 reports by author and title, that contain climatic maps for Ireland. Also included are descriptive comments concerning the contents of these reports.
PB-176 039 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS OF GERMANY,
Weather Bureau, Washington, D. C.
Vincent J. Creasi, and J. Allen Wallace, Jr. Mar 58, 43p WB/BM-4
Sponsored by the Directorate of Climatology of the Air Weather Service, USAF, Washington, D. C.

Descriptors: (*West Germany, *Climatology), (*East Germany, Climatology), (*Meteorological charts, Bibliographies), Atmospheric precipitation, Rain, Wind, Atmospheric temperature, Hail, Thunderstorms, Snow, Cloud cover, Humidity, Fog.

Map portrayal of climatic elements presents an easy means of comparing one part of a country with another. This bibliography of climatic maps for Germany stresses the period 1940 to the present. Abstracts marked with a + are for charts of West Germany; those marked with an * are for East Germany and those left unmarked are for all Germany. Most meteorological elements were included. Emphasis was placed on maps summarized over a period of years. Principally, climatic maps for areas larger than Germany were excluded from this compilation so that mean upper air maps are scarce. Abstracts are arranged by ten year groups; the years are indicated by publication date of the source. The subject classification index indicates only general classification numbers; thus maximum temperatures are under M24 temperature. This applies to both alphabetical and numerical indexes.
PB-176 040 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS OF THE ARABIAN PENINSULA,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Nov 60, 13p WB/BM-15
Sponsored by the Air Weather Service Climatic Center, USAF, Washington, D. C.

Descriptors: (*Arabia, *Climatology), (*Middle East, Climatology), (*Meteorological charts, Bibliographies), Air mass analysis, Clouds, Dew point, Temperature inversion, Solar radiation, Visibility, Fog, Humidity, Snow, Cyclones, Thunderstorms, Wind.

This bibliography of climatic maps has been compiled from available sources in the Weather Bureau Library, Department of Agriculture Library, Geological Survey Library and the Library of Congress. Since very few maps of the Arabian Peninsula appear in the meteorological and climatological literature, the following geographic divisions which contain all or part of this particular area and adjacent regions have also been included: the Middle East, southwest Asia, eastern Mediterranean area, southwest Asia and northeast Africa and the Persian Gulf area. Map scales are presented in the abstracts.
PB-176 041 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS: EASTERN MEDITERRANEAN,
Weather Bureau, Washington, D. C.
A. E. Grimes. 24 Oct 57, 8p WB/BM-1

Descriptors: (*Mediterranean Sea, *Climatology), (*Meteorological charts, Bibliographies), Wind, Atmospheric precipitation, Rainfall, Clouds, Barometric pressure, Visibility, Fog, Atmospheric temperature, Anomalies, Humidity, Air mass analysis, Cloud cover.

The bibliography lists 32 reference sources and includes descriptive comments about the contents in these sources.
PB-176 042 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON CLOUD INFORMATION AND DATA FOR MAINLAND CHINA,
Weather Bureau, Washington, D. C.
J. Allen Wallace, Jr. Mar 66, 45p WB/BS-2
Sponsored by Air Weather Service Environmental Technical Applications Center, USAF, Washington, D. C.

Descriptors: (*China, Clouds), (*Cloud cover, Bibliographies), Far East, Upper atmosphere, Weather stations, Wind, Cirrus clouds, Meteorological parameters.

This bibliography consists of sources containing cloud information and data for Mainland China. One hundred and eight references are listed. All

available sources in the U. S. Department of Commerce, Weather Bureau Library, Washington, D. C., were examined and abstracted. Geographical Location Indices are found at the end of this bibliography.
PB-176 043 HC$3.00 MF$0.65

CLIMATOLOGICAL ASPECTS OF THE VIRGIN SOIL PROJECT IN THE U. S. S. R.,
Weather Bureau, Washington, D. C.
Nina A. Stepanova. Dec 51, 35p

Descriptors: (*Agriculture, Climatology), (*Climatology, USSR), Rural areas, Soils, Atmospheric precipitation, Snow, Trees, Atmospheric temperature, Meteorological charts, Air mass analysis, Anticyclones, Siberia.

The agricultural development of the so-called 'virgin lands' of the Soviet Union undoubtedly is one of the major feasts in the post-war history of Russia. It is a development which is fraught with considerable risks. Principal among these are the marginal weather conditions in the newly developed areas of Kazakhstan and Western Siberia. Soils there are fertile but drought and a short freeze free season are major hazards to grain crops. It seemed worthwhile to assess on the basis of the many existing Russian studies the potential of this new Soviet development. This survey is designed to give an elementary introduction to pertinent climatological literature published by Soviet scientists.
PB-176 045 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY OF CLIMATIC MAPS OF SWEDEN,
Weather Bureau, Washington, D. C.
Annie E. Grimes. Nov 61, 26p WB/BM-32
Research supported in part by Air Weather Service Climatic Center, USAF.

Descriptors: (*Sweden, *Climatology), (*Meteorological charts, Bibliographies), Wind, Clouds, Cyclones, Floods, Fog, Hail, Ice, Upper atmosphere, Humidity, Snow, Storms, Atmospheric temperature, Visibility, Thunderstorms.

This bibliography on climatic maps has been compiled from available sources in the Weather Bureau Library, Department of Agriculture Library, Geological Survey Library and the Library of Congress. Abstracts in the 'Selected Bibliography on Climatic Maps for Sweden' June 1959 have been incorporated in this bibliography. Seventy-three references are listed. Map scales are presented in the abstracts. In the absence of printed information the scales have been determined by a map scale indicator.
PB-176 046 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY OF CLIMATIC MAPS OF PEOPLE'S REPUBLIC OF CHINA,
Weather Bureau, Washington, D. C.
J. Allen Wallace, Jr. Sep 61, 21p
Research supported in part by ARE Weather Service Climatic Center, USAF.

Descriptors: (*China, *Climatology), (*Meteorological charts, Bibliographies), Thunderstorms, Air mass analysis, Barometric pressure, Tropical cyclones, Cloud cover, Weather forecasting, Atmospheric precipitation, Periodic variations, Solar radiation, Humidity, Atmospheric temperature, Wind.

The document lists 50 references with descriptive comments concerning the contents of these references. The period covered is from 1901 to 1961.
PB-176 047 HC$3.00 MF$0.65

BIBLIOGRAPHY OF THE CLIMATE OF TURKEY,
Weather Bureau, Washington, D. C.
A. D. Peterson, and N. A. Stepanova. May 57, 29p WB/BM-33

Descriptors: (*Turkey, Climatology), (*Climatology, Bibliographies), Atmospheric temperature, Rainfall, Barometric pressure, Humidity, Clouds, Wind, Storms, Air mass analysis, Atmospheric precipitation, Fog, Ceiling, Asia.

The document includes a listing of reports by title and author, and includes descriptive comments concerning the contents of these reports. Also included are comments by the compiler concerning his recommendations for best sources of information within the bibliography.
PB-176 048 HC$3.00 MF$0.65

PROJECT ECCRO: A SYNOPTIC EXPERIMENT IN THE TROPICS.
Technical memo.,
National Hurricane Research Lab., Miami, Fla.
Toby N. Carlson. Aug 67, 38p IERTM-NHRL-80

Descriptors: (*Caribbean Sea, *Meteorological parameters), Radiosondes, Meteorological instruments, Atmospheric sounding, Atmospheric temperature, Meteorological charts, Wind, Cloud cover, Meteorological satellites, Statistical analysis.
Identifiers: ECCRO project.

An intensive reconnaissance expedition, involving the use of multilevel aircraft flights and special radiosonde ascents, was carried out over the eastern Caribbean during a relatively quiescent period in October 1965. This paper contains, first, an outline of the type of instrumentation used and the methods applied in reducing, correcting, and analyzing the data. Next, sample analyses are presented for each of the five levels and for 1 of the 6 days of the project, showing the distribution of winds, geopotential heights, temperatures, mixing ratios, vertical velocities, and cloud patterns. Finally, a summary of the spatial variability of the various quantities is given with a discussion concerning the amount of uncertainty in the analyses. (Author)
PB-176 071 HC$3.00 MF$0.65

5. BEHAVIORAL AND SOCIAL SCIENCES

5A. Administration and Management

THINKING ABOUT FUTURE SOCIAL DEVELOPMENT,
Rand Corp Santa Monica Calif
Joseph M. Goldsen. Sep 67, 19p Rept no. P-3680
Prepared for presentation at the Annual Meeting of the American Institute of Certified Public Accountants (89th), Portland, Oregon, September 27, 1967.

Descriptors: (*Management planning, Social sciences), (*Urban planning, Economics), Problem solving, Public opinion, Predictions, Population, Labor, Automation, Political science, Behavior, Language, Memory, Anxiety, Federal budgets, Systems engineering, Statistical analysis.

A studied view of possible social and economic developments which will inevitably have impact upon the financial and other entities which certified public accountants serve.
AD-658 423 HC$3.00 MF$0.65

SOME COMMENTS ON SYSTEMS ANALYSIS,
Rand Corp Santa Monica Calif
C. H. Fisher. Sep 67, 18p Rept no. P-3677
Prepared for presentation at the 'Systems Analysis and Cost-Effectiveness' session of a MORS Symposium, State Dept. Auditorium, Washington, Oct 67.

Descriptors: (*Department of Defense, Management planning), (*Management planning, Optimization), Decision making, Scheduling, Costs, Cost effectiveness.
Identifiers: Systems analysis.

Systems analysis denotes the process of helping to sharpen the intuition and judgment of the decisionmakers through the more precise statement of problems, thorough identification (and often invention) of the relevant alternatives, measurement of their costs, identification of their probable benefits, explicit treatment of the uncertainties involved, and a serious attempt to estimate the effects of policy alternatives. These are commonsensical ideas, but actually doing them is often extraordinarily complex and demanding. Much progress has been made to date; but a great deal remains to be done in the future. Further progress will require ingenious thinking, and above all just plain hard work.
AD-658 426 HC$3.00 MF$0.65

DIGITAL COMPUTER SIMULATION: MODELING CONCEPTS,
Rand Corp Santa Monica Calif
P. J. Kiviat. Aug 67, 62p Rept no. RM-5378-PR
Contract F44620-67-C-0045

Descriptors: (*Digital computers, *Simulation), (*Management planning, Models (Simulations)), Programming (Computers), Optimization, Decision making, Flow charting.
Identifiers: Systems analysis.

The report contains a discussion of the basic concepts of the techniques of digital computer simulation: the study provides a rationale for simulation, discusses the design and construction of simulation models, and relates simulation as a technique to current problems in simulation technology.
AD-658 429 HC$3.00 MF$0.65

THE MADAM SYSTEM: DATA MANAGEMENT WITH A SMALL COMPUTER.
Professional paper,
System Development Corp Santa Monica Calif
Emory W. Franks. 8 Sep 67, 19p Rept no. SP-2944/000/00

Descriptors: (*Information retrieval, Digital computers), (*Records, Digital computers), (*Management control systems, Digital computers), Data storage systems, Programming languages, Documentation, Data processing systems, Coding.
Identifiers: MADAM, IBM 360, IBM 1400.

The paper discusses the uses of the MADAM system for data management tasks on the small, free-standing computer such as the IBM 1401 or IBM 360/30. It is largely nontechnical in approach and is addressed to managers rather than to computer personnel. An example of a problem and its solution is given to demonstrate the speed and simplicity of MADAM usage. (Author)
AD-658 472 HC$3.00 MF$0.65

TECHNOLOGICAL CHANGE AND PUBLIC ADMINISTRATION.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 5K.
AD-658 473 HC$3.00 MF$0.65

CAVEAT EMPTOR SYSTEMATIBUS (LET THE BUYER OF SYSTEMS BEWARE).
Professional paper,
System Development Corp Santa Monica Calif
Charles Fanwick. 1 Aug 67, 13p Rept no. SP-2900

Descriptors: (*Systems engineering, Reviews), (*Sociology, Systems engineering), (*Management

planning, Systems engineering), Digital computers, Data processing systems, Decision making, Economics, Analysis.

Takes a cynical look at some of the dangers of the 'Systems Approach'. Points to the paralysis wrought by over-analysis, and to the necessity for the systemist to recognize the user's needs. (Author)
AD-658 481 HC$3.00 MF$0.65

PARALLEL AND SEQUENTIAL STRATEGIES FOR R AND D PROJECTS.
Final rept.,
Harvard Univ Cambridge Mass Graduate School of Business Administration
Richard S. Rosenbloom, and William J. Abernathy. Jan 67, 132p
Contract Nonr-1866 (54), Grant NSF-GP-2723
Availability: Published in Copyrighted journal. Hard copy available for Harvard Univ., Cambridge. Graduate School of Business Administration.

Descriptors: (*Management planning, *Decision making), (*Research program administration, Decision making), Economics, Systems engineering, Scientific research, Scheduling, Predictions, Optimization, Department of Defense, Models (Simulations), Uncertainty, Cost effectiveness, Probability.

It is common in R and D to identify and explore several approaches to a particular objective so that the best approach may be chosen. The outcome of any approach is uncertain; hence it is difficult to choose the best one at an early date. To deal with this uncertainty, two or more approaches to the identified objective may be continued in parallel until a clear choice can be made, i.e., a parallel strategy. Such a strategy can provide better information for a decision, maintain options, or hedge against the occurrence of an unsatisfactory outcome. This report addresses the manager's problem of deciding when to use or continue a parallel strategy, reporting the results of studies of actual projects and of digital simulation analysis of a model appropriate to the structure of the decision as it is faced in practice. It identifies the information requirements for a sound choice between parallel and sequential strategies and the consequence of choosing a strategy on the basis of incomplete information. The report demonstrates the feasibility of collecting the requisite economic data in actual projects and suggests that it is costly for project managers ignore such data. (Author)
AD-658 544 Not available from CFSTI.

POSTATTACK RECOVERY MANAGEMENT: CONCEPTS AND TECHNIQUES FOR MODEL DEVELOPMENT.
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 15C.
AD-658 744 HC$3.00 MF$0.65

COMMUNICATIONS OR TRANSPORT: DECISION-MAKING IN DEVELOPING COUNTRIES.
Massachusetts Inst of Tech Cambridge Center for International Studies
For primary bibliographic entry see Field 17B.
AD-658 816 HC$3.00 MF$0.65

GENERAL RESEARCH.
Quarterly technical summary rept. 1-31 Jul 67,
Massachusetts Inst of Tech Lexington Lincoln Lab
Frederick C. Frick, V. Alexander Nedzel, Stephen H. Dodd, Melvin A. Herlin, and Jerome Freedman. 15 Aug 67, 51p
ESD-TR-67-327
Contract AF 19 (628)-5167
See also AD-654 662.

Descriptors: (*Data processing systems, Scientific research), (*Radar, Scientific research), (*Physics, Scientific research), (*Solid state physics, Scientific research), Computers, Films, Magneto-optic effect, Man-machine systems, Information retrieval, Space surveillance systems, Radio astronomy, Space communication systems, Microwave equipment, Antennas, Mechanical engineering, Control systems.

This Quarterly Technical Summary covers the period from 1 May through 31 July 1967. It consolidates the reports of Division 2 (Data Systems), Division 3 (Radio Physics), Division 4 (Radar), Division 7 (Engineering), and Division 8 (Solid State) on the General Research Program at Lincoln Laboratory. (Author)
AD-658 834 HC$3.00 MF$0.65

PROGRAM OF RESEARCH ON THE MANAGEMENT OF RESEARCH AND DEVELOPMENT.
Annual rept. 1965-6 and program summary, 1960-6,
Northwestern Univ Evanston Ill Dept of Industrial Engineering and Management Sciences
Albert H. Rubenstein. Sep 66, 55p Rept no. 66-32
Contract N00014-66-C-0020A01, Grant NsG-495

Descriptors: (*Research program administration, *Management engineering), Operations research, Organizations, Scientific research, Information retrieval, Engineering, Social communication.
Identifiers: Research and development.

Contents: Characteristics of Northwestern's program of research on the management of research and development; Personnel associated with program - September 1965-September 1966; Code for availability of publications, reports, and working papers; Descriptions of individual projects (idea flow in research and development, control of research and development in decentralized organizations, strategies for organization and diffusion of research in developing countries, R and D responses to crises, sources of R and D achievements in electronics since 1945, the acquisition and development of new technical skills in research and development, integration and utilization of management science activities in organizations, liaison relations: transition and interface problems between phases of research, development and application, the information-seeking behavior of researchers, project selection in R and D, key researchable problem areas in R and D management, environmental and management factors influencing the performance of research and development groups, other related activities); Theses and dissertations.
AD-658 897 HC$3.00 MF$0.65

SHELTER MANAGEMENT TEXTBOOK.
Office of Civil Defense Washington D C
For primary bibliographic entry see Field 15C.
AD-658 898 HC$3.00 MF$0.65

R AND D ABSTRACTS. VOLUME 20 NUMBER 13, 1-15 JULY 1967.
Ministry of Technology London (England) Technical Information and Library Services
For primary bibliographic entry see Field 5B.
AD-658 978 HC$3.00 MF$0.65

MASTER DEVELOPMENT PLAN, PLYMOUTH INDUSTRIAL PARK, PLYMOUTH, MASSACHUSETTS.
Anderson-Nichols and Co., Inc., Boston, Mass.
Sep 67, 72p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Management engineering, Industries), (*Economics, *Management planning), Site selection, Roads, Transportation, Construction, Population, Labor, Employment, Hospitals, Water supplies, Drainage, Sewage, Electric power production, Education, Recreation, Costs.

The master plan presents information on improvements, costs, and priority of construction; together with data on available labor, real estate values and types of industry for which a location in the Park would be well suited.
PB-176 088 HC$3.00 MF$0.65

ANALYSIS AND EVALUATION OF BAY AREA RAPID TRANSIT SELF-SERVICE FARE COLLECTION SYSTEM DEMONSTRATION.
FMC Corp., Santa Clara, Calif. Machinery/Systems Group.
For primary bibliographic entry see Field 13F.
PB-176 098 HC$3.00 MF$0.65

5B. Documentation and Information Technology

THE MADAM SYSTEM: DATA MANAGEMENT WITH A SMALL COMPUTER.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-658 472 HC$3.00 MF$0.65

RESEARCH ON SELF-ORGANIZING MACHINES.
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 9B.
AD-658 527 HC$3.00 MF$0.65

THE REPORT OF THE AD HOC COMMITTEE ON VSTOL TERMINOLOGY.
Air Force Flight Test Center Edwards AFB Calif
For primary bibliographic entry see Field 1C.
AD-658 545 HC$3.00 MF$0.65

SIGNAL GLOSSARY. ENGLISH-VIETNAMESE, VIETNAMESE-ENGLISH. FIRST EDITION (Tu Dien Truyen Tin. Anh-Viet, Viet-Anh. Xuat Ban Lan Thu Nhat.).
Military Assistance Command Vietnam San Francisco Calif 96222 Training Aids Div
Apr 67, 319p Rept no. MACT-TAD-1, TD-100/4-8
TT-67-62917

Descriptors: (*Dictionaries, *Vietnam), (*Communication systems, Dictionaries), Handbooks, Language, Vocabulary.
Identifiers: Vietnamese language.

The document is comprised of paired listings of corresponding terms and phrases of the English and Vietnamese languages in the field of communications and communication equipment. Entries are listed alphabetically, first in Engish and then in Vietnamese.
AD-658 663 HC$3.00 MF$0.65

GLOSSARY OF AUTOMOTIVE AND VEHICLE MAINTENANCE TERMS. ENGLISH-VIETNAMESE, VIETNAMESE-ENGLISH. FIRST EDITION (Tu Dien Quan Xa. Anh-Viet, Viet-Anh. Xuat Ban Lan Thu Nhat).
Military Assistance Command Vietnam San Francisco Calif 96222 Training Aids Div
Apr 67, 407p Rept no. MACT-TAD-2, TD-100/7-7
TT-67-62918

Descriptors: (*Dictionaries, *Vietnam), (*Vehicles, Dictionaries), Maintenance, Handbooks, Language, Vocabulary.
Identifiers: Vietnamese language.

The document is comprised of paired listings of corresponding terms and phrases of the English and Vietnamese languages in the field of vehicle maintenance and engineering. Entries are listed alphabetically, first in English and then in Vietnamese.
AD-658 664 HC$3.00 MF$0.65

ARTILLERY GLOSSARY. ENGLISH-VIETNAMESE, VIETNAMESE-ENGLISH. FIRST EDITION (Tu Dien Phao Binh. Anh-Viet, Viet-Anh. Xuat Ban Lan Thu Nhat).
Military Assistance Command Vietnam San Francisco Calif 96222 Training Aids Div
May 67, 572p Rept no. MACT-TAD-3, TD-100/2-9
TT-67-62916

Descriptors: (*Dictionaries, *Vietnam), (*Artillery, Dictionaries), Weapons, Armed forces operations, Handbooks, Language, Vocabulary.
Identifiers: Vietnamese language.

The document is comprised of paired listings of corresponding terms and phrases of the English and Vietnamese languages in the field of artillery equipment and operations. Entries are listed alphabetically, first in English and then in Vietnamese.
AD-658 665 HC$3.00 MF$0.65

MULTIPLE TEST OF ABC METHOD. PART III. MATHEMATICAL MODEL,
Harry Diamond Labs Washington D C
Werner H. Menden, and Bert Levy. May 67, 39p Rept no. HDL-TR-1334
ATLIS-18
See also AD-625 924.

Descriptors: (*Information retrieval, Mathematical models), Dictionaries, Statistical analysis, Probability, Documentation, Technical information centers.
Identifiers: Maximum likelihood.

The report suggests a method of constructing a mathematical model for the first test of the ABC Storage and Retrieval Systems and calculates 95-percent confidence intervals for relevance and recall values. (Author)
AD-658 668 HC$3.00 MF$0.65

SOVIET CYBERNETICS: RECENT NEWS ITEMS NO. 8,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 9B.
AD-658 818 HC$3.00 MF$0.65

ESTABLISHMENT OF A STINFO PROGRAM FOR THE AIR FORCE AERO PROPULSION LABORATORY.
Progress rept. Jul-Dec 66,
Dayton Univ Ohio Research Inst
James M. Tierney, Ann T. Dodson, and Antionette L. Lueck. Aug 67, 36p Rept no. UDRI-PR-67-136
Contract AF 33 (615)-2993

Descriptors: (*Technical information centers, Air Force), (*Documentation, Personnel management), Information retrieval, Dissemination, Manpower, Data processing systems, Propulsion, Department of Defense, Data storage systems.
Identifiers: STINFO.

Basically the program consists of three main functions: literature searching, document acquisition and storage, and the dissemination of information. The procedures associated with these functions are described in detail and statistics are presented to account for the day-to-day activities. STINFO personnel, after establishing the program, are to train government employees in a six-month period to assume operation of the program after completion of the contract. Therefore, task descriptions and staffing requirements are included. (Author)
AD-658 849 HC$3.00 MF$0.65

A COMPUTERIZED 3-D PLOTTING PROGRAM.
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 9B.
AD-658 857 HC$3.00 MF$0.65

THE ZOO AND THE JUNGLE - A COMPARISON OF THE INFORMATION PRACTICES OF INTELLIGENCE ANALYSIS AND OF SCIENTISTS,
Air Force Office of Scientific Research Arlington Va
Harold Wooster. 1967, 11p Rept no. AFOSR-67-2208
Availability: Published in Information System Science and Technology, Thompson Book Co., Washington, D. C., C14 1967 p307-15.

Descriptors: (*Military intelligence, Information retrieval), (*Information retrieval, Scientific personnel), (*Information theory, Scientific research), Documentation, Classification, Research program administration, Data processing systems, Programming (Computers), Manpower.

Both the scientists and the intelligence analyst are concerned with converting the information from scientific and technical documents into written manuscripts. Although the scientist devotes a large portion of his time to information processing this is only incidental to his overt goal, gaining new knowledge and insight, and his covert goal, enhancing his stature in the scientific community by peer group recognition. The scientist, qua information processor, is an untrained, part-time amateur. The intelligence analyst is a trained, full-time professional. The scientist deals largely with unwritten informal information sources; the analyst is usually confined to formal written sources. The analyst labors under certain handicaps which are inescapable concommitants of the information with which he deals and the uses to which it is put. Mechanization can provide a partial, but only a partial, amelioration of some of these handicaps.
AD-658 942 Not available from CFSTI.

R AND D ABSTRACTS. VOLUME 20 NUMBER 13, 1-15 JULY 1967.
Ministry of Technology London (England) Technical Information and Library Services
1967, 69p
See also AD-658 303.

Descriptors: (*Scientific research, Abstracts), Reports, Great Britain.

R and D abstracts is issued twice a month by Technical Information and Library Services, Ministry of Technology. It is intended primarily to serve Ministry of Technology branches and their contracters by abstracting, as promtly as possible classified and unclassified reports which are received from the Ministry, other government agencies, industry and universities.
AD-658 978 HC$3.00 MF$0.65

MANNED EXPEDITIONS TO MARS: A SELECTIVE BIBLIOGRAPHY,
TRW Systems Redondo Beach Calif
For primary bibliographic entry see Field 22B.
AD-658 997 HC$3.00 MF$0.65

ANNUAL REPORT: AUTOMATIC INDEXING AND ABSTRACTING.
Annual progress rept.
Lockheed Missiles and Space Co Palo Alto Calif Electronic Sciences Lab
Mar 67, 118p Rept no. LMSC-M-21-67-1
Contract Nonr-4440 (00)

Descriptors: (*Subject indexing, Automatic), (*Abstracts, Processing), (*English language, *Linguistics), Phonetics, Information retrieval, Syntax, Data processing systems, Russian language, Dictionaries, Computer programs.

The investigation is concerned with the development of automatic indexing, abstracting, and extracting systems. Basic investigations in English morphology, phonetics, and syntax are pursued as necessary means to this end. In the first section the theory and design of the 'sentence dictionary' experiment in automatic extraction is outlined. Some of the computer programs needed for this experiment have been completed; documentation for these programs is included. The second section is a discussion of an unconventional information retrieval system which may be used to retrieve English or Russian technical literature. Specifically, there is a discussion of the query language and of the data base structure. The design of this system is complete and programming has begun. The third section comprises a final report in an exhaustive study of the relation between the orthographic and phonetic forms of English monosyllables. The paper reports on the methods and accuracy of the algorithm to map the orthographic forms of English into the phonetic forms given by five different phonetic authorities, or to map the phonetic form given by one authority into that given by another. (Author)
AD-659 057 HC$3.00 MF$0.65

US ARMY CHEMICAL INFORMATION AND DATA SYSTEM.
Rept. for May 65-May 66,
Edgewood Arsenal, Md.
James P. Mitchell. May 66, 59p
CIDS-Status-6

Descriptors: (*Chemistry, *Data processing systems), (*Information retrieval, Chemistry), Army research.
Identifiers: CIDS Project.

The primary purpose of this report is to describe the current status of the Army Chemical Information and Data System (CIDS), which is a part of the US Army STINFO program. The background and significance of CIDS to the Army, the guidelines for CIDS, and the milestones in relation to the project structure are presented along with the accomplishments and forecasts. The current and future work is described by employing the DD Form 1498 work unit technique. The milestones are outlined in a series of tables giving the history and forecasts of the work. DD Form 1498, Research and Technology Resume, a reporting system for technical and management data at the work unit level, is included in the appendix. (Author)
AD-808 736 HC$3.00 MF$0.65

INDEX TO NASA TECH BRIEFS, JANUARY - JUNE 1967.
National Aeronautics and Space Administration, Washington, D. C.
Aug 67, 47p NASA-SP-5021/05/

Descriptors: *Abstract, *Science, *Technology, Biology, Biotechnology, Computer, Electricity, Electronics, Index, Material, Mechanics, Physical, Program.

For abstract, see STAR 05 21.
N67-35596 HC$3.00 MF$0.65

AUTOMATED LITERATURE PROCESSING HANDLING AND ANALYSIS SYSTEM - FIRST GENERATION.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
23 Jun 67, 513p NASA-TM-X-60246, RSIC-549
Contract DAAHO3-67-C-0019

Center, 23 Jun. 1967 513 P Prepared By Hayes International Corp. Joint Report With Army Missile Command

Descriptors: *Automatic data processing system, *Data analysis, *Information retrieval, Analysis, Automatic, Computer, Control, Data, Documentation, Handling, Information, Library, Literature, Processing, Retrieval, Storage, Subsystem, System.

For abstract, see STAR 05 21.
N67-36582 HC$3.00 MF$0.65

ESSA/SIDD LIBRARY BRANCH SURVEY.
Final rept.,
Perreault (Jean) and Associates.
J. M. Perreault, J. C. Colson, and K. M. Baker.
Sep 67, 41p
Contract E-130-67 (N)

Descriptors: (*Libraries, Reviews), (*Information retrieval, Management planning), (*Meteorology, Libraries), Documentation, Catalogs, Bibliographies, Subject indexing, Costs, Data processing systems, Decision making.

The survey team was engaged for the purpose of studying current operations of the ASL and GSL (libraries) with a view to developing recommendations for operational improvement and expansion through the utilization of feasible EDP and retrieval systems. The findings of the survey team are presented in 5 parts: The first part contains the conclusions and recommendations of the survey team; The second part discusses certain functional problems involved in achievement of ESSA's library service objectives, which also are relevant to implementation of the major recommendations contained in this report; The third part contains recommendations for the ordering and timing of tasks to be accomplished in the implementation of this report. It also recommends steps to be taken for the necessary orientation and instruction of staff in the utilization of the major systems proposed. Part four is a discussion of the equipment required for implementation of the systems proposed herein; Part five, the Appendices, are a discussion of technical considerations upon which the survey team based the major recommendations contained herein.
PB-175 962 HC$3.00 MF$0.65

5C. Economics

CONSUMPTION COOPERATION IN RURAL AREAS IN THE USSR: A COMMENT,
Rand Corp Santa Monica Calif
Nancy Nimitz. Sep 67, 9p Rept no. P-3674

Descriptors: (*Rural areas, USSR), (*Consumption, *Economics), Commerce, Population, Costs, Money, Urban areas, Social sciences, Distribution (Economics), Food.

In the years before collectivization, when consumer cooperatives served both urban and rural areas, their distinctive rural function was to accustom the peasant to joint enterprises, and thus prepare him for cooperative production. In 1935 (after collectivization was substantially accomplished) the state took over most urban trade, but retained cooperatives in the countryside because a separate distribution network made it easier to discriminate against the peasant consumer. Today, when discrimination is no longer sought, cooperatives persist because they are, potentially at least, more efficient (more autonomous, hence more able to respond to local needs) than the bureaucratic state system.
AD-658 425 HC$3.00 MF$0.65

THE 'VALUE OF THE GAME' AS A TOOL IN THEORETICAL ECONOMICS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 12A.
AD-658 427 HC$3.00 MF$0.65

COST-BASED PRICING AND LABOR ELASTICITY,
Rand Corp Santa Monica Calif
Fred D. Arditti, and Merton J. Peck. Sep 67, 24p
Rept no. P-3438-1
Prepared in cooperation with Yale Univ., New Haven, Conn.

Descriptors: (*Labor, Elasticity), (*Wages, Industries), (*Aircraft industry, Training), Costs, Economics, Inequalities, Employment, Industrial procurement, Money, Education, Job analysis.

Examines the labor elasticity of the aircraft industry, that is, the variation in labor inputs associated with sales variations. The hypothesis is that the aircraft industry adjusts its labor supply more sluggishly than other manufacturing industries because much of their sales are to the government through contracts that call for prices based on incurred costs. Such a hypothesis is not particularly novel; a common observation is that defense project cancelation leads to an overall employee reduction significantly less than the numbers involved in the project. Section II of this paper uses a simple profit maximization model to demonstrate why this occurs. Section III quantifies and tests the model. Section IV considers the implications of results.
AD-658 428 HC$3.00 MF$0.65

CAVEAT EMPTOR SYSTEMATIBUS (LET THE BUYER OF SYSTEMS BEWARE).
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-658 481 HC$3.00 MF$0.65

ECONOMIC ANALYSIS OF THE SHORT-HAUL TRANSPORT.
Systems Analysis and Research Corp Boston Mass
For primary bibliographic entry see Field 1C.
AD-658 743 HC$3.00 MF$0.65

AIR TRAFFIC CONTROL SYSTEMS COSTS.
Federal Aviation Administration Washington D C Systems Research and Development Service
For primary bibliographic entry see Field 17G.
AD-659 034 HC$3.00 MF$0.65

WORK OF THE ARMED FORCES IN THE ECONOMIC AND SOCIAL DEVELOPMENT OF THE COUNTRIES (MILITARY CIVIC ACTION).
Inter-American Defense Board Washington D C
For primary bibliographic entry see Field 5D.
AD-659 037 HC$3.00 MF$0.65

A DYNAMIC INPUT-OUTPUT MODEL OF THE CALIFORNIA EDUCATIONAL SYSTEM.
California Univ Berkeley Center for Research in Management Science
For primary bibliographic entry see Field 5I.
AD-659 050 HC$3.00 MF$0.65

A STUDY OF THE ECONOMIC IMPACT OF INTERSTATE HIGHWAY 10 ON CHAMBERS COUNTY, TEXAS.
Research rept.,
Texas Transportation Inst., College Station.
Jesse L. Buffington. Mar 67, 22p RR-4-10, Bull-39
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Economics), Rural areas, Commerce, Terrain, Money, Analysis, Tables.
Identifiers: Economic growth.

The report contains research of a rural area along Interstate Highway 10 about 50 miles east of Houston, between State Highway 61 and Winnie, in Chambers County. A before and after analysis of sales along the Interstate highway and in a nearby control area, indicates positive land value influences traceable to the building of Interstate Highway 10. The land use changes in the study area were to higher uses with new commercial enterprises appearing near the interchanges. The researcher concludes that the performance of selected economic indicators suggests that the economic base of Chambers County has been modestly stimulated by the construction of Interstate Highway 10. During the period from 1958 to 1963 retail trade sales increased from $8 million to $11 million. Bank deposits increased by over fifty percent from 1959 to 1964. County tax valuations for the period 1959 to 1964 increased from slightly over $40 million to nearly $62 million. (Author)
PB-175 947 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION VII,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 968 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION VIII,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 969 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION IX,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 970 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION X,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 971 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION XI,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 972 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION XII,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 973 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION XIII,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 974 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION XIV,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 975 HC$3.00 MF$0.65

SUMMARY OF AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 976 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART II. AN ACTION PROGRAM FOR IMPLEMENTING GREATER UTILIZATION OF THE LABOR SUPPLY IN THREE PILOT COUNTIES,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 977 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE STATE'S LABOR SURPLUS,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 978 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION VI,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 979 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION V,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 980 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION IV,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 981 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION III,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 982 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION II,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 983 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION I,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
For primary bibliographic entry see Field 5I.
PB-175 984 HC$3.00 MF$0.65

FEASIBILITY OF DEVELOPING COMMERCIAL RECREATION AND TOURISM FACILITIES, SANTA CLARA RESERVATION, NEW MEXICO.
Kirschner Associates, Inc., Albuquerque, N. Mex.
Aug 67, 40p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Recreation, New Mexico), (*Economics, Feasibility studies), Costs, Population, Urban areas, Employment, Roads, Water supplies, Fishes, Management engineering, Money, Food, Transportation, Labor, Terrain, Lakes.

The purpose of this study is to identify and analyze the economic feasibility of potential commercial developments related to existing and proposed recreation and tourism attractions on the Santa Clara Indian Reservation of northern New Mexico. The analyses cover both the Puye Cliff Ruins and the Santa Clara Canyon areas of the Reservation. These areas are in the same general location but appeal to two different types of visitors; Santa Clara Canyon appeals to the outdoor recreationist while Puye Cliff Ruins attracts tourists. Consequently, this study encompasses analyses of these two different markets because they represent the greatest potential for economic growth. Market estimates for proposed commercial facilities are projected for a ten-year period (1967-1976). Market estimates are expressed in terms of expected revenues for various types of commercial establishments and are then related to development and operating costs to determine the financial feasibility of proposed enterprises. Development schedules for proposed facilities are derived from the feasibility analyses. Amortization schedules are presented based on alternative equities on total investment required. Alternative forms of ownership, management and financing arrangements for the proposed facilities are then discussed and evaluated.
PB-176 063 HC$3.00 MF$0.65

FIRST ANNUAL REPORT OF THE EAST CAROLINA UNIVERSITY REGIONAL DEVELOPMENT INSTITUTE JUNE 1, 1966 -- MAY 31, 1967.
East Carolina Univ. Regional Development Inst., Greenville, N. C.
Oct 67, 37p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Economics, North Carolina), Money, Population, Universities, Industries, Training, Employment, Law, Recreation, Commerce.
Identifiers: Area redevelopment.

The geographic area served by the East Carolina University Regional Development Institute is that region composed of the thirty-two easternmost counties of North Carolina. The general purpose of the Institute is to contribute toward understanding and facilitating the process of regional growth and development. The Institute's efforts will result in increased and improved employment opportunities, higher incomes, and thus higher standdards of living for the people of Eastern North Carolina. The accomplishment of the following tasks is a major goal of the Institute: To provide the accurate and factual foundation needed to assist the economic growth of the counties, cities, and communities of Eastern North Carolina. This includes gathering, correlating, and distributing information on human, natural, and community resources. To establish a SCHOOL OF CONTINUING EDUCATION in every field of economic endeavor for the people of the region. This school organizes, plans and coordinates educational meetings dealing with various phases of community life such as commerce, industry, tourism, agriculture and the like. Such meetings are of the conference, seminar, or panel discussion type. To provide and promote the leadership necessary for implementation of development programs emanating from the foregoing objectives. To conduct studies of specific and general nature of various economic situations and to implement these studies. The report contains a summary of the activities of the East Carolina University Regional Development Institute during the contract period ending on May 31, 1967. (Author)
PB-176 066 HC$3.00 MF$0.65

MASTER DEVELOPMENT PLAN. PLYMOUTH INDUSTRIAL PARK, PLYMOUTH, MASSACHUSETTS.
Anderson-Nichols and Co., Inc., Boston, Mass.
For primary bibliographic entry see Field 5A.
PB-176 088 HC$3.00 MF$0.65

THE MARKET FOR PLASTICS PRODUCTION EQUIPMENT, RAW MATERIALS AND SEMI-FINISHED PRODUCTS IN ITALY.
Oliver-Beckman Italiana S.r.l., Rome (Italy).
For primary bibliographic entry see Field 11I.
PB-176 095 HC$3.00 MF$0.65

5D. History, Law, and Political Science

POLITICS OF MODERNIZATION.
Final rept. Sep 64-Mar 66,
California Univ Berkeley Inst of International Studies
David E. Apter. Mar 66, 10p
AFOSR-67-2111
Grant AF-AFOSR-758-65

Descriptors: (*Political science, Latin America), Argentina, Chile, Peru, Government (Foreign), Decision making, Population, Economics, Students, Social sciences.

The report describes briefly the preparation of a theoretical framework for the study of modernizing nations, and its application to some of the main problems of political modernization in selected Latin American countries. Members of the project held special seminars for both the presentation of original papers and the discussion of research procedures and plans.
AD-658 474 HC$3.00 MF$0.65

THE CURRENT AND THE PAST OF LIN PIAO,
Rand Corp Santa Monica Calif
Liu Yuen-sun. Aug 67, 61p Rept no. LT-67-52 TT-67-62908
Trans. of Studies on Chinese Communism, n.p., nl p61-77 1967.

Descriptors: (*Communism, China), (*Leadership, Political science), Propaganda, Environment, Behavior, Military strategy, Military training, Learning, Personality, Strategic warfare.

The 'Great Proletarian Cultural Revolution' in China in its more active, Red Guard phase, is more than a year old. One of the major changes which have come about, of course, concerns the major perturbations in the top hierarchy of the Chinese Communist Party, and in particular the fall of Liu Shao-ch'i from the number two post in the Party. The Maoist succession was never in doubt, however, for Liu's decline, dating from August 1966, varied directly with the rise to prominence of Lin Piao, the Defense Minister. Lin, who is known as Mao's 'close comrade-in-arms', is now officially regarded as Mao's successor.
AD-658 493 HC$3.00 MF$0.65

SOVIET MILITARY POLICY AT THE FIFTY-YEAR MARK,
Rand Corp Santa Monica Calif
Thomas W. Wolfe. Sep 67, 49p Rept no. RM-5443-PR
Contract F44620-67-C-0045

Descriptors: (*Military strategy, USSR), (*Government (Foreign), *Leadership), Armed forces (Foreign), Political science, Counterinsurgency, Insurgency, Foreign policy, Defense systems, Deterrence, Armed forces budgets.

During the fifty years' existence of the Soviet Union, its leaders have sought to turn growing military power to political advantage. Although there has been no radical change of direction in Soviet defense preparations or in strategic philosophy, the present government has undertaken a substantial buildup in strategic delivery forces and ABM defenses. The possibility of involvement in 'local' wars is admitted, but how far the Soviet Union is prepared to go in committing forces and resources remains a critical question. The perennial problems that attend the relations of Soviet leaders with their own military remain: maintaining political control over the armed forces in times of crisis; meshing industrial and military planning; and balancing their traditional reluctance to grant the military an influential voice in policy formulation against their growing need for the military's professional expertise.
AD-658 813 HC$3.00 MF$0.65

COMMUNICATIONS OR TRANSPORT: DECISION-MAKING IN DEVELOPING COUNTRIES,
Massachusetts Inst of Tech Cambridge Center for International Studies
For primary bibliographic entry see Field 17B.
AD-658 816 HC$3.00 MF$0.65

REACTION SYSTEMS AND INSTABILITY IN INTERPERSONAL AND INTERNATIONAL AFFAIRS.
State Univ of New York Buffalo Dept of Psychology
For primary bibliographic entry see Field 5J.
AD-658 901 HC$3.00 MF$0.65

WORK OF THE ARMED FORCES IN THE ECONOMIC AND SOCIAL DEVELOPMENT OF THE COUNTRIES (MILITARY CIVIC ACTION).
Inter-American Defense Board Washington D C
8 Jun 65, 90p Rept no. T-255, 65/112

Descriptors: (*Foreign aid, *Armed forces (United States)), Economics, Social sciences, Agriculture, Mapping, Industrial production, Education, Training, Housing, Public health, Transportation, Communication systems, Management planning, National defense.

Reports on accomplishments in the field of military civic action and opens a first approach to the study of this field of economic-social activities of the armed forces. The information is organized, on functional bases, in the following chapters: Farming and stock raising development; Cartography, studies and research; Industrial development; Education and training; Health, housing and community development; Transportation and communication routes; Telecommunications; and Military civic action of the Armed Forces of the United States of America. It should be noted, moreover, that in emergency situation such as floods, earthquakes, epidemics, and other disasters, the Armed Forces move in with their entire human and material resources. They do work in the various situations above mentioned, in support of the populations affected, and in close coordination with other civilian agencies.
AD-659 037 HC$3.00 MF$0.65

5E. Human Factors Engineering

TWO-HANDED RETENTION ON VARIOUS HANDLE CONFIGURATIONS.
Final rept.,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
John W. Garrett, Milton Alexander, and William G. Bennett. May 67, 23p Rept no. AMRL-TR-67-63

Descriptors: (*Strength, Performance (Human)), (*Human engineering, Ejection seats), Endurance, Anthropology, Muscles, Males.

Data are presented on the manual grip-retention capability of seated persons. Nine male subjects, grasping experimental ejection actuators located forward of an ejection seat pan, were required to maintain their grasp against force loadings of 50 to 500 pounds. Grip retention at various increments of time to a maximum of 30 seconds are compared for each of the four handles: a T-bar, Twin grips, a standard D-ring and a flexible Gemini-type loop. Test results indicated that the T-bar provides the greatest grip-retention capability. Potential applications of these performance data are discussed. (Author)
AD-658 441 HC$3.00 MF$0.65

AN ANALYSIS OF RUNWAY VISUAL RANGE.
Weather Bureau Atlantic City N J Test and Evaluation Lab
For primary bibliographic entry see Field 1E.
AD-658 537 HC$3.00 MF$0.65

ADEQUATE HEAD ROOM IN TANKS.
Army Medical Research Lab Fort Knox Ky
27 Nov 42, 10p

Descriptors: (*Tanks (Combat vehicles), *Human engineering), Fatigue (Physiology), Head, Personnel, Seats, Helmets, Thickness.

The purpose of the report is to determine the sitting heights of Armored Force personnel and to compare these with existing head clearances in tanks. Sitting posture is a significant factor in fatigue. (Author)
AD-658 561 HC$3.00 MF$0.65

REPORT ON WILD HEERBRUGG RANGEFINDER, 80cm BASE, 1944.
Army Medical Research Lab Fort Knox Ky
19 Apr 46, 10p
Rept. on prop. 'Night Vision in Tanks', and 'Investigation of Short Base Rangefinders.'

Descriptors: (*Optical equipment, Range finding), Army equipment, Human engineering, Tanks (Combat vehicles), Performance (Engineering), Vision.

This rangefinder is very similar to the US M1916 rangefinder both in design and performance. The Heerbrugg instrument offers no improvement over the US M1916 model and is in some respects inferior.
AD-658 579 HC$3.00 MF$0.65

REPORT ON PERISCOPIC SIGHT T8 AND MOUNT T105,
Army Medical Research Lab Fort Knox Ky
F. S. Brackett. 22 Sep 44, 18p

Descriptors: (*Periscopic gun sights, Tanks (Combat vehicles)), (*Human engineering, Periscopic gun sights), Mounting brackets, Head, Supports, Light, Performance (Engineering), Design, Mechanical drawings.

Performance of the T8 is superior to any sight previously tested. Sight mount T105 interferes unnecessarily with the armor, thus increasing the time required for installation, but can be used as an interim measure. Head-rest must be modified to incorporate depth adjustability and eliminate interference with helmet. Springs employed in mount to exert pressure on sight are defective in design, necessitating a change to insure proper function and retention in position. Removal of extraneous light in illumination of the 6 power sight reticle is needed for effective night operations. The rheostat does not provide enough range of brightness for reflex reticle. Improvement in eye cup design for 6 power sight is desirable. (Author)
AD-658 584 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE,
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch. 18 Sep 44, 18p Rept no. 1

Descriptors: (*Gunnery trainers, *Human engineering), (*Gunnery, Performance (Human)), Firing tests (Ordnance), Errors, Training, Design.

The purpose of the research was to make preliminary observations on the nature, source and magnitude of errors which occur in Field Artillery practice and to outline a plan for further study designed to determine: (1) the causes and relative frequency of errors from different sources; (2) the relative influence of errors from various sources upon effectiveness and density of artillery fire; (3) the degree of improvement in effectiveness of artillery fire which can be expected from proposed changes in instruments and procedures.
AD-658 588 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE,
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch, Frederick S. Brackett, and Steven M. Horvath. 28 Mar 45, 44p Rept no. 4
Rept. on proj. 'An Analysis of the Source of Error in the Use of the Aiming Circle and Development of an Improved Instrument.'

Descriptors: (*Gun sights, *Human engineering), (*Gunnery, Performance (Human)), Design, Training, Firing tests (Ordnance), Errors.

The purposes of the research were (1) to determine the principal causes of error in reading horizontal angles with the standard M1 aiming circle; and (2) to develop basic improvements in principles of design which will eliminate such sources of error and to incorporate these in a practical field instrument.
AD-658 589 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch, F. S. Brackett, and Steven M. Horvath. 13 Jun 45, 7p

Descriptors: (*Human engineering, *Gunnery), (*Fire control systems, Performance (Human)), Errors, Corrections, Design, Instrumentation.

The primary objective of this project was to determine the principal causes of human error in the use of the fire-control instruments employed by the field artillery and to develop improved designs of instruments which would reduce the frequency of such errors. In the course of this study, however, it became increasingly evident that the fire-control instruments are not the only contributors to error and that for a complete study of the problem, equal consideration must also be given to the errors arising from deficiencies in artillery procedures. (Author)
D-658 590 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE,
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch, Frederick S. Brackett, and Steven M. Horvath. 6 Apr 45, 15p Rept no. 3
Rept. on proj. 'Analysis of Requirements for Eliminating Errors in Laying Guns in Elevation.'

Descriptors: (*Gunnery trainers, *Human engineering), (*Gunnery, Performance (Human)), Design, Training, Firing tests (Ordnance), Errors.

The purpose of the research was to investigate sources of personnel errors in laying the gun in elevation and to recommend improvements in instrument design to minimize chances of error from this source in artillery practice.
AD-658 591 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE.
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch, Frederick S. Brackett, and Steven M. Horvath. 22 Mar 45, 34p Rept no. 2

Descriptors: (*Gunnery, Performance (Human)), (*Gunnery trainers, *Human engineering), Telescopic gun sights, Design, Efficiency, Errors, Firing tests (Ordnance).

The purposes of the research were (1) To determine the principal causes of error in reading horizontal angles with the standard M12 panoramic telescope, to develop principles of design to eliminate such sources of error and incorporate these in a practical field instrument; (2) to study the nature and sources of errors in making deflection shifts and to indicate the essential requirements in design and performance of an improved gunner's aid.
AD-658 592 HC$3.00 MF$0.65

PHYSIOLOGICAL AND OPERATIONAL CHARACTERISTICS OF T26E3 TANK,
Army Medical Research Lab Fort Knox Ky
F. S. Brackett, Lester B. Roberts, Norton A. Nelson, Wendell E. Mann, and Robert H. Walpole.
28 Feb 45, 14p

Descriptors: (*Tanks (Combat vehicles), *Human engineering), Efficiency, Fire safety, Vision, Ventilation, Performance (Human), Design.

The T26E3 tank was appraised as to its physiological characteristics, with special reference to crew efficiency and comfort, effectiveness of fire control, provision for general vision and ventilation.
AD-658 593 HC$3.00 MF$0.65

OPERATIONAL AND PHYSIOLOGICAL CHARACTERISTICS OF THE TANK T26E3, (M26).
Final rept.,
Army Medical Research Lab Fort Knox Ky
Robert H. Walpole, Norton Nelson, and Edward D. Palmes. 31 Jul 45, 20p
Rept. on Study of the Proposed Relocation of the 100 CFM Tank Ventilating Blower to the Turret Bulge.

Descriptors: (*Ventilation fans, Tanks (Combat vehicles)), (*Human engineering, *Tanks (Combat vehicles)), Tank turrets, Performance (Engineering).

The purpose of the research was to determine the suitability of relocating the 1000 cfm ventilating fan in the turret bulge.
AD-658 594 HC$3.00 MF$0.65

PHYSIOLOGICAL CHARACTERISTICS OF THE T25E1-T26E1 TANK. CONTROL OF GUN FUME HAZARD,
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch, Norton Nelson, and Glasselle S. Lawson. 19 Jul 44, 10p

Descriptors: (*Tanks (Combat vehicles), *Human engineering), Hazards, Gunnery, Exhaust gases, Tolerances (Physiology), Ventilation, Design, Hatches, Gun turrets.

The original ventilating system was found to provide inadequate control of gun fumes. This was true with the turret hatches open as well as with the tank completely closed. The static pressure and air volume provided by the 1000 cfm fan were found to give adequate control of gun fumes from the 90 mm gun and the two machine guns, with the tank completely buttoned-up or with one or both turret hatches open. Adequate control of gun fumes was had with the 1000 cfm fan even when a 4-3/8 inch port in the rear turret deck was open. Control of gun fumes was inadequate with both turret hatches open, bulkhead door removed and tank engine operating at idling speed and with ventilating fan off. (Author)
AD-658 596 HC$3.00 MF$0.65

MILITARY CHARACTERISTICS AND DESIGN OF OBSERVATION TELESCOPE.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 17H.
AD-658 597 Not available from CFSTI.

DETERMINATION OF THE SOURCES, MAGNETUDE AND COSTS OF GUNNERY ERRORS,
Army Medical Research Lab Fort Knox Ky
T. F. Hatch, Glasselle S. Lawson, and J. G. Daily.
16 Jun 44, 28p

Descriptors: (*Human engineering, *Machine guns), (*Gunnery, Performance (Human)), Errors, Costs, Guns, Effectiveness, Tanks (Combat vehicles), Motion, Gyro stabilizers.

The report deals with the effectiveness of moving fire, using the coaxial machine gun. The basic test procedures were selected for favorable operation of the gyrostabilizer. Only the nature of targets and tank speeds were varied to approximate more nearly the combat conditions for use of the machine gun. Comparative tests were conducted with and without the gyrostabilizer, at tank speeds of 2 and 10 mph and against three types of targets: large, exposed panels; so-called area targets of considerable length and limited height; and standard silhouette of head-on prone man.
AD-658 598 HC$3.00 MF$0.65

SEAT CUSHIONS FOR TRUCK (4 x 4) 1/4 TON (PEEP),
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13F.
AD-658 601 HC$3.00 MF$0.65

BINOCULAR MODIFICATION PROVIDING QUICK ADJUSTMENT OF INTERPUPILLARY DISTANCE AND DIOPTER SETTING.
Army Medical Research Lab Fort Knox Ky
15 Oct 45, 10p

Descriptors: (*Binoculars, *Human engineering), Illumination, Design, Photographs, Night vision.

The purpose of the report is to discuss need for binocular IPD and diopter adjustments especially for night operations and to describe on method of meeting the requirements. (Author)
AD-658 602 HC$3.00 MF$0.65

MANUAL TRAVERSING EFFORT IN TANKS,
Army Medical Research Lab Fort Knox Ky
Lester B. Roberts, Wendell E. Mann, and Clifford G. Riker. 10 Oct 45, 19p

Descriptors: (*Training gear, Tanks (Combat vehicles)), (*Human engineering, Training gear), Operation, Force (Mechanics), Performance (Engineering), Military requirements.

The purpose of the research was to determine magnitude of factors affecting manual traverse effort in current tanks.
AD-658 624 HC$3.00 MF$0.65

TREATMENT OF MESS KITS TO REMOVE GLARE,
Army Medical Research Lab Fort Knox Ky
Norton A. Nelson. 6 May 44, 6p

Descriptors: (*Kitchen equipment + supplies, Finishes + finishing), (*Human engineering, Kitchen equipment + supplies), Optical properties, Army equipment, Reflection, Hydrochloric acid, Solutions.

The purpose of the research was to test the suitability of a process for the elimination of glare from aluminum mess kits.
AD-658 627 HC$3.00 MF$0.65

PHYSIOLOGICAL AND OPERATIONAL CHARACTERISTICS OF TANK T25E1.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Frederick S. Brackett, Lester B. Roberts, Norton A. Nelson, and Robert H. Walpole. 8 Nov 44, 12p

Descriptors: (*Tanks (Combat vehicles), *Human engineering), Design, Ventilation, Seats, Exhaust gases, Fire control systems, Vision, Hazards, Control panels, Storage, Dust.

The report deals with fire control, general vision, hatchways, seats, internal stowage, and location of controls. The earlier findings on ventilation are summarized and further discussion of ventilation from the standpoint of dust and heat is presented.
AD-658 630 HC$3.00 MF$0.65

SUGGESTED MODIFICATIONS IN THE TURRET OF THE M5A1 TANK TO IMPROVE GUNNER-COMMANDER'S POSITION, USE OF SIGHTS AND OPERATION OF CONTROL,
Army Medical Research Lab Fort Knox Ky
Lester B. Roberts. 9 Aug 43, 27p

Descriptors: (*Gun turrets, *Human engineering), Design, Gun sights, Tanks (Combat vehicles), Anthropometry.

Space limitations in the turret of the M5A1 tank are such that completely adequate man clearance, based upon the full range of anthropometric measurements of personnel, cannot be obtained. A certain amount of restriction must be accepted. A study of the spatial arrangements of seats, controls, etc., in the present tank suggests, however, that improvements can be secured without interfering with basic functions of the vehicle. In order to demonstrate the possibility of such changes from the standpoint of space requirements and to determine the degree of improvement which may be obtained, modifications were made in an M5A1 tank which are described in this report.
AD-658 639 HC$3.00 MF$0.65

ANALYSIS OF PHYSIOLOGICAL CHARACTERISTICS OF T9E1 TANK,
Army Medical Research Lab Fort Knox Ky
Willard Machle. 27 Mar 44, 60p

Descriptors: (*Tanks (Combat vehicles), *Human engineering), Seats, Design, Display systems, Control panels, Hatches, Lighting equipment, Ventilation, Effectiveness.

The purposes of the research were: (1) to evaluate the present model of tank T9E1 with respect to its physiological characteristics and limitations, including: space for crew, seat design and location in relation to vision devices and controls, design and location of hatchways, lighting, ventilation, placement of sights and vision devices and characteristics and limitation of the vision facilities. (2) To indicate the nature and magnitude of the corrections which are necessary to insure effective use of the vehicle by the crew from the standpoint of physiological requirements.
AD-658 640 HC$3.00 MF$0.65

PHYSIOLOGICAL AND OPERATIONAL CHARACTERISTICS OF M-24 TANK.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Frederick S. Brackett, Lester B. Roberts, Norton Nelson, and Robert H. Walpole. 8 Nov 44, 12p

Descriptors: (*Tanks (Combat vehicles), *Human engineering), Design, Ventilation, Fire control, Vision, Seats, Hatches.

The purpose of the research was to appraise subject tank from the standpoint of physiological characteristics and limitations. Conclusions: Provision for drawing heated air from engine compartment for crew compartment ventilation in winter is potentially dangerous; present system of ventilation is inadequate for control of gun fumes; provisions for close-in general vision are inadequate; driver's vision should be improved; fire control provisions are satisfactory except for fact that present arrangement will not accommodate M10 periscopic sight; head rest adjustment on telescope should be improved; bow hatch locks for open position not sufficiently positive for operation over rough terrain; effort required to open escape hatch is too great; padding around hatch openings is insecurely fastened; seat backs are not easily removed and more positive fasteners are required for seat cushions; there is insufficient space for accelerator pedal action when large shoes and arctics are worn; 75 mm gun recoil interferes with commander's right leg.
AD-658 641 HC$3.00 MF$0.65

PHYSIOLOGICAL CHARACTERISTICS OF T23 TANK.
Army Medical Research Lab Fort Knox Ky
5 Jun 43, 28p

Descriptors: (*Tanks (Combat vehicles), *Human engineering), Seats, Design, Display systems, Control panels, Hatches, Lighting equipment, Ventilation, Effectiveness.

The purposes of the research were: (1) To evaluate the present pilot model of tank T23 with respect to its physiological characteristics and limitations, including: size, shape and functioning of hatchways, seat design and adjustment, lighting, ventilation (from the standpoint of control of gun fumes and removal of heat), placement of sights and functioning of vision devices. (2) To indicate the nature and magnitude of the corrections to insure adequate characteristics and to define the limitations of these improvements.
AD-658 643 HC$3.00 MF$0.65

EXPERIMENTS IN DISPLAY EVALUATION.
Franklin Inst Research Labs Philadelphia Pa Systems Science Dept
For primary bibliographic entry see Field 5H.
AD-658 733 HC$3.00 MF$0.65

INTEGRATED COCKPIT RESEARCH PROGRAM. APPENDIX I.
Litton Systems Inc Woodland Hills Calif Guidance and Control Systems Div
For primary bibliographic entry see Field 1C.
AD-658 753 HC$3.00 MF$0.65

INTEGRATED COCKPIT RESEARCH PROGRAM. APPENDIX II.
Litton Systems Inc Woodland Hills Calif Guidance and Control Systems Div
For primary bibliographic entry see Field 1C.
AD-658 754 HC$3.00 MF$0.65

ANNUAL ARMY HUMAN FACTORS RESEARCH AND DEVELOPMENT CONFERENCE (12th) HELD AT THE U. S. ARMY INFANTRY CENTER, FORT BENNING, GEORGIA, 2-5 OCTOBER 1966.
Office of the Chief of Research and Development (Army), Washington, D. C.
Oct 66, 352p

Descriptors: (*Human engineering, Symposia), (*Army, Symposia), Training, Performance (Human), Measurement, Visibility, Military personnel, Combat readiness, Military psychology, Tactical warfare, Night warfare, Adaptation (Physiology), Vision, Social psychology.

Contents: Human factors research and development in today's world crises; U. S. troops and local peoples; Training; Measurement of troop performance; Night operations; Information precessing. (Author)
AD-805 030 HC$3.00 MF$0.65

STUDY OF ASTRONAUT CAPABILITIES TO PERFORM EXTRAVEHICULAR MAINTENANCE AND ASSEMBLY FUNCTIONS IN WEIGHTLESS CONDITIONS.
Airesearch Mfg. Co., Los Angeles, Calif.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 21.
N67-36491 HC$3.00 MF$0.65

A PROFILE OF HUMAN FACTOR REQUIREMENTS IN THE MARITIME INDUSTRY,
George Washington Univ., Washington, D. C.
Joseph Monane. Apr 65, 86p
Contract MA-3392

Descriptors: (*Shipping (Marine), *Cargo ships), (*Human engineering, Automation), Labor, Manpower, Training, Sequential analysis, Costs, Transfer of training, Learning, Morale, Labor unions, Personnel management, Interactions.

The present research report provides a survey of the U. S. maritime industry and its research needs in the field of human relations. Recommendations for research are made in the areas of: (1) Employee allegiance, (2) Settlement of disputes, (3) Promotion of maritime prosperity and growth, (4) Development of human resources, (5) Improvement of communications in cargo transfer systems, and (6) Human engineering. Priority projects in these areas are selected, and research designs for them are provided.
PB-175 940 HC$3.00 MF$0.65

5G. Linguistics

LISP 2 DOCUMENT CONVENTIONS.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 9B.
AD-658 420 HC$3.00 MF$0.65

LISP 2 LANGUAGE SPECIFICATIONS.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 9B.
AD-658 421 HC$3.00 MF$0.65

SOME NOUN-TO-NOUN DERIVATIONAL AFFIXES.
Professional paper,
System Development Corp Santa Monica Calif
Talmy Givon. 29 Jul 67, 48p Rept no. SP-2893
Contract F19628-67-C-0004

Descriptors: (*Semantics, English language), (*Syntax, English language), Vocabulary, Analysis.
Identifiers: Nouns.

Sense definitions of nouns as listed in 'Webster's Third International Dictionary' were studied, with particular emphasis on the patterns of sense development induced on nouns by the suffixes -DOM, -HOOD, -SHIP and -AGE. The senses were classified by their 'syntactic features', upon which the sense shifts were defined. It is suggested that no formal distinction exists between the 'syntactic' and 'semantic' features or processes. It is further suggested that sense development and coinage or derivation of new vocabulary items are the same process. It is further suggested that the semantic system of nouns in the lexicon of English involves the hierarchy of nouns that underlie the meaning of other nouns, and that the 'syntactic feature' system employed in the study is a reflection of this deeper system. It is finally suggested that the lexicon of a language comprises sense listings, rules

specifying the semantic structures of lexical items, and rules specifying the way by which the various sense entries are related to each other or derived from each other. These last rules, termed lexical derivation rules, should also specify new derivations that can potentially occur. (Author)
AD-658 887 HC$3.00 MF$0.65

A HORNBOOK OF HAZARDS FOR LINGUISTS,
Connecticut Coll New London Dept of Philosophy
Alice Koller. Apr 67, 281p
AFOSR-67-0770
Grants AF-AFOSR-787-65, AF-AFOSR-987-67

Descriptors: (*Linguistics, Philosophy), Analysis, Semantics, Information retrieval, Machine translation, Grammars.

A critical analysis is presented of some beliefs about language and linguistics to which most contemporary linguists assent but which nevertheless hinder their theoretical work. The beliefs are: that the data of linguistics are concrete physical objects; that linguistic method is primarily descriptive; that linguistic laws are laws of nature comparable to physical laws; that linguistics is an empirical science using inductive methods; that (contrariwise) linguistics is a formal science comparable to logic; that languages are codes; that the notion of correctness has no place in linguistics (particularly, that linguistics provides no basis for statements about correct usage); that the meanings of words are arbitrary; that meanings are associations and hence subjective; that (contrariwise) meanings are things-out-in-the-world and hence too plentiful; that individual words can be either ambiguous or meaningless; that words point to reality; that only nouns, verbs, adjectives and adverbs are meaningful; that linguists need to invent their own theory of meaning before they can get on with their work; that (contrariwise) linguists need have nothing to do with the meanings of words; that the notion of units of meaning both makes sense and is useful; that all sentences possess information content; that the notion of well-formedness adds something important to grammatical theory; that structure takes priority over meaning in constructing a grammar; and that speaking a language depends upon the prior reconstruction of the theory of that language. The purpose of the analysis is to invite linguists to free themselves from these beliefs. (Author)
AD-658 904 HC$3.00 MF$0.65

ANNUAL REPORT: AUTOMATIC INDEXING AND ABSTRACTING.
Lockheed Missiles and Space Co Palo Alto Calif Electronic Sciences Lab
For primary bibliographic entry see Field 5B.
AD-659 057 HC$3.00 MF$0.65

5H. Man-Machine Relations

A GRAPHIC TABLET DISPLAY CONSOLE FOR USE UNDER TIME-SHARING.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 9B.
AD-658 470 HC$3.00 MF$0.65

APPLICATIONS OF COMPUTERS IN EDUCATION.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 5K.
AD-658 476 HC$3.00 MF$0.65

AN ETHICAL AND MORAL ANALYSIS OF THE DESIGN FOR A MAN-MACHINE COUNSELING SYSTEMS: REACTIONS BY A UCLA GRADUATE CLASS IN COUNSELING.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 5K.
AD-658 482 HC$3.00 MF$0.65

EXPERIMENTS IN DISPLAY EVALUATION.
Phase 1 of technical rept.,
Franklin Inst Research Labs Philadelphia Pa Systems Science Dept
Daniel Landis, Robert M. Slivka, James M. Jones, and Carl A. Silver. Jul 67, 9p Rept no. TR-1-194
Contract Nonr-4832 (00)

Descriptors: (*Display systems, Effectiveness), Analysis of variance, Reviews, Human engineering, Decision making.
Identifiers: Evaluation.

Four experiments were performed with the following objectives: (1) further explore a proposed method of display evaluation; (2) relate the proposed method to conventional measures of display 'goodness'; (3) examine the effects of three types of informational irrelevancy on decision adequacy; and (4) test a hypothesis relating to the effects of compressing discrete informational units onto single symbols. In all experiments except those related to objective 2, the subject's task was to make a military-type decision based on information presented on the display. Two decision-game formats were used; the first was logistical while the second used an air-reconnaissance situation. In these studies, each decision the subject made was associated with an explicit cost-payoff function. Since each problem required a series of such decisions, a weighted sum of the payoffs, minus the costs, was the method of display evaluation. Each of several display variables (such as density, use of color, or clutter), and response variables (such as search time) was related to cost-payoff scores, depending on the experiment. Major conclusions were that the decision-quality metric is potentially useful for evaluating display systems, and that information-extraction measures apparently are unrelated to the metric. It was also revealed that the effectiveness of a display is positively related to the amount and randomness of irrelevant information presented in the display. (Author)
AD-658 733 HC$3.00 MF$0.65

INTEGRATED COCKPIT RESEARCH PROGRAM. APPENDIX I.
Litton Systems Inc Woodland Hills Calif Guidance and Control Systems Div
For primary bibliographic entry see Field 1C.
AD-658 753 HC$3.00 MF$0.65

INTEGRATED COCKPIT RESEARCH PROGRAM. APPENDIX II.
Litton Systems Inc Woodland Hills Calif Guidance and Control Systems Div
For primary bibliographic entry see Field 1C.
AD-658 754 HC$3.00 MF$0.65

NATURAL COMMUNICATION WITH COMPUTERS.
Bolt Beranek and Newman Inc Cambridge Mass
For primary bibliographic entry see Field 9B.
AD-658 829 HC$3.00 MF$0.65

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5A.
AD-658 834 HC$3.00 MF$0.65

SPECIAL PROBLEMS IN THE ESTIMATION OF BEARING.
Johns Hopkins Univ Baltimore Md
For primary bibliographic entry see Field 17C.
AD-658 891 HC$3.00 MF$0.65

HUMAN OPERATOR RESPONSE SPEED, FREQUENCY, AND FLEXIBILITY - A REVIEW, ANALYSIS AND DEVICE DEMONSTRATION.
Dunlap and Associates, Inc., Santa Monica, Calif.
C. R. Kelley, M. B. Mitchell, D. J. Proisin, and M. J. Wargo. Sep 67, 80p NASA-CR-874
Contract NAS12-103

Descriptors: *Auditory perception, *Display system, *Manual control, *Operator performance, *Visual display, Auditory, Control, Development, Device, Display, Flexibility, Frequency, Human, Manual, Muscle, Operator, Perception, Performance, Response, Speed, Survey, System, Visual.

For abstract, see STAR 05 21.
N67-35872 HC$3.00 MF$0.65

5I. Personnel Selection, Training and Evaluation

OPERATIONAL SPECIFICATION FOR EXERCISE AND EVALUATION CAPABILITY,
Mitre Corp Bedford Mass
For primary bibliographic entry see Field 9B.
AD-658 436 HC$3.00 MF$0.65

THE CURRENT AND THE PAST OF LIN PIAO,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5D.
AD-658 493 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 588 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 589 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 591 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 592 HC$3.00 MF$0.65

PROBABILITY INDEXES OF IMAGE INTERPRETER PERFORMANCE: DEVELOPMENT AND EVALUATION.
North American Aviation Inc Columbus Ohio Columbus Div
For primary bibliographic entry see Field 14E.
AD-658 653 HC$3.00 MF$0.65

THE DEVELOPMENT OF SPECIFICATIONS OF A STANDARD DISPLAY BOARD FOR ARMY FIELD FORCES.
Technical rept.,
Dunlap and Associates Inc Stamford Conn
Joseph F. Weigandt, John E. Murray, and Ralph C. Channell. 15 Feb 53, 61p
SPECDEVCEN-927-00
Contract Nonr-927 (00)

Descriptors: (*Display systems, *Training devices), Army equipment, Specifications, Design, Military requirements, Standardization.

The objective of the study was a design for a Standard Display Board which incorporates the best

features of display devices currently being used at Army installations.
AD-658 739 MF$0.65

EXPERIMENT IN CRYOGENICS FOR THE UNDERGRADUATE.
Clemson Univ S C
For primary bibliographic entry see Field 20C.
AD-658 805 Not available from CFSTI.

EDUCATIONAL AND TRAINING MEDIA: A SYMPOSIUM,
National Academy of Sciences-National Research Council Washington D C Committee on Military Psychology
Glen Finch. 19 Aug 59, 210p
NAS-NRC-Pub-789
Availability: Hard copy available from National Academy of Sciences-National Research Council, Washington, D. C., $2.00.

Descriptors: (*Education, Symposia), (*Training, Symposia), Instructors, Textbooks, Teaching methods, Graphics, Training films, Television communication systems, Teaching machines, Training devices.

Contents: The role of media in education and training; The instructor; Textbooks and methodology; The job as a medium for training; Graphic aids, models and mockups; The instructional film; Teaching by television; Part trainers; Teaching machines.
AD-658 817 MF$0.65

TRAINING AND RETENTION OF AIR FORCE AIRMEN: AN ECONOMIC ANALYSIS,
Rand Corp Santa Monica Calif
John McCall, and Neil Wallace. Aug 67, 44p Rept no. RM-5384-PR
Contract F44620-67-C-0045

Descriptors: (*Air Force personnel, Electronic technicians), (*Air Force training, Electronic technicians), Economics, Personnel management, Recruiting.

The responsiveness of the reenlistment rate of Air Force electronic specialists to changes in Air Force remuneration and the degree to which Air Force training is transferable to the civilian economy are examined. For this sample of airmen, the reenlistment rate is very sensitive to differences between civilian and Air Force earnings opportunities. The results imply that if the initial reenlistment rate were 50 percent, and if Air Force remuneration were increased by $1,000 per year, then the reenlistment rate would rise to about 70 percent. The actual reenlistment rate for electronic specialists was 35 percent in 1962; the current reenlistment rate has declined to approximately 15 percent. The data indicate that a large percentage of electronic specialists use their Air Force training in the civilian economy, and that the advantage of using such training, measured in earning power, is significant. (Author)
AD-658 822 HC$3.00 MF$0.65

ESTABLISHMENT OF A STINFO PROGRAM FOR THE AIR FORCE AERO PROPULSION LABORATORY.
Dayton Univ Ohio Research Inst
For primary bibliographic entry see Field 5B.
AD-658 849 HC$3.00 MF$0.65

COMPUTER-ASSISTED INSTRUCTION (CAI).
Technical rept.,
Harvard Computing Center Cambridge Mass
Lawrence M. Stolurow. Jun 67, 86p Rept no. TR-2
Contract N00014-67-A-0298-0003

Descriptors: (*Programmed instruction, *Computers), Problem solving, Teaching methods, Theory, Multiple operation, Students, Education.
Identifiers: Computer-aided instruction.

The purposes of CAI are described. Five modes of use are described; problem solving; drill and practice; simulation and gaming; tutorial instruction; and author. The multi-media character of CAI is described. A model of CAI is developed; it is the idiographic contingency model (ICM). The model treats instruction as a multiple decision process. The first is the pretutorial; the second is the tutorial process; the third process is concerned with maintaining or changing the teaching program by altering the teaching strategy (logic). Implications for curriculum planning, man-machine relations, operation and assessment and evaluation are discussed. (Author)
AD-658 869 HC$3.00 MF$0.65

THE HARVARD UNIVERSITY COMPUTER-ASSISTED INSTRUCTION LABORATORY.
Technical rept.,
Harvard Computing Center Cambridge Mass
Lawrence M. Stolurow. May 67, 24p Rept no. TR-1
Contract N00014-67-A-0298-0003

Descriptors: (*Programmed instruction, *Computers), Time sharing, Education, Problem solving, Laboratories, Computer personnel, Feasibility studies, Management planning.
Identifiers: Computer-aided instruction.

The report describes the purpose, organization and plan of the Harvard CAI Laboratory. (Author)
AD-658 873 HC$3.00 MF$0.65

SHELTER MANAGEMENT TEXTBOOK.
Office of Civil Defense Washington D C
For primary bibliographic entry see Field 15C.
AD-658 898 HC$3.00 MF$0.65

THE ZOO AND THE JUNGLE - A COMPARISON OF THE INFORMATION PRACTICES OF INTELLIGENCE ANALYSIS AND OF SCIENTISTS,
Air Force Office of Scientific Research Arlington Va
For primary bibliographic entry see Field 5B.
AD-658 942 Not available from CFSTI.

THE MODERNIZATION OF MAN,
Harvard Univ Cambridge Mass Center for International Affairs
For primary bibliographic entry see Field 5J.
AD-658 956 Not available from CFSTI.

A DYNAMIC INPUT-OUTPUT MODEL OF THE CALIFORNIA EDUCATIONAL SYSTEM.
Technical rept.,
California Univ Berkeley Center for Research in Management Science
Lawrence P. Nordell. Aug 67, 114p Rept no. TR-25
Contract Nonr-222 (77), Grant NsG-243

Descriptors: (*Education, *Economics), (*Labor, Education), Mathematical models, Manpower, Industrial production, Universities, Management planning, Dynamic programming.

An input-output table is drawn up for the educational system using data drawn from California sources. Provision is made for the survival of faculty stocks and for the use of graduate student teaching assistants. A recursion relationship is then derived to draw from various specifications of future final demand for educated personnel, inputs required in each year up to a finite horizon. (Author)
AD-659 050 HC$3.00 MF$0.65

EFFECTS OF RACE OF TESTER, APPROVAL-DISAPPROVAL AND NEED ON NEGRO CHILDREN'S LEARNING.
Michigan Univ Ann Arbor
For primary bibliographic entry see Field 5J.
AD-659 052 HC$3.00 MF$0.65

PIPEFITTING, PLUMBING FORMULAS. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.
Naval Facilities Engineering Command, Washington, D. C.
For primary bibliographic entry see Field 13K.
PB-175 927 HC$3.00 MF$0.65

A PROFILE OF HUMAN FACTOR REQUIREMENTS IN THE MARITIME INDUSTRY,
George Washington Univ., Washington, D. C.
For primary bibliographic entry see Field 5E.
PB-175 940 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION VII,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 29p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 969 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 968 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION VIII,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones. May 67, 31p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 969 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION IX,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 29p
Prepared in cooperation with Economic Development Administration. Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 970 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION X,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 29p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 971 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELGF AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION XI,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 31p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.
This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 972 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION XII,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 29p
Prepared in cooperation with Economic Development Administration, Washington. D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 973 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION XIII,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 30p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 974 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION XIV,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 31p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 975 HC$3.00 MF$0.65

SUMMARY OF AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Forrest H. Pollard. May 67, 14p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Wages, Education, Economics, Labor.

The purpose of this project was to evaluate Arkansas' labor resource for economic growth and to develop methods for greater utilization of this resource in the immediate future. The research method involved two major steps. The first was an analysis of the current labor resource available for economic growth. The second step involved working with three pilot counties to develop practical suggestions for increasing the utilization of their current labor resource in the immediate future.
PB-175 976 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART II. AN ACTION PROGRAM FOR IMPLEMENTING GREATER UTILIZATION OF THE LABOR SUPPLY IN THREE PILOT COUNTIES,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Forrest H. Pollard, Jerry W. Duran, and B. Fern Lentz. Nov 66, 199p
Prepared in cooperation with Economic Development Administration, Washington, D. C. See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Economics, Labor, Tables, Commerce.

The report discusses: the study objective, procedures to be used in analyzing the problem, and selection of pilot counties; past accomplishments and efforts to promote economic development; the labor resources; methodology used in the analysis of natural and man-made resources; and the evolvement of an action program for each of the pilot counties.
PB-175 977 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE STATE'S LABOR SURPLUS,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Deanna W. Gomez. May 67, 123p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Wages, Education, Economics, Labor, Tables.

Study measures and describes Arkansas labor surplus. It presents the data and analyzes the findings for the state as a whole. And it examines differences in the size and characteristics of the labor surplus among subregions of the state.
PB-175 978 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION VI,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 29p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 979 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION V,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 28p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 980 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION IV,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 28p
Prepared in cooperation with Economic Development Administration, Washington, D. C., See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (Subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 981 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION III,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 29p
Prepared in cooperation with Economic Development Administration, Washington, D. C. See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 982 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I: THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION II,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 26p
Prepared in cooperation with Economic Development Administration, Washington, D. C. See also PB-175 968 thru PB-175 984.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 983 HC$3.00 MF$0.65

AN ANALYSIS OF ARKANSAS' HUMAN RESOURCES FOR ECONOMIC GROWTH AND AN APPLICATION OF THE FINDINGS TO DEVELOP AN ACTION PROGRAM FOR THREE COUNTIES. PART I. THE MEASUREMENT AND DESCRIPTION OF THE LABOR SURPLUS: SUBREGION I,
Arkansas Univ., Little Rock. Industrial Research and Extension Center.
Ethel B. Jones, and Carol Eiseman. May 67, 28p
Prepared in cooperation with Economic Development Administration, Washington, D. C. See also PB-175 968 thru PB-175 983.

Descriptors: (*Arkansas, *Manpower studies), (*Employment, Arkansas), Statistical analysis, Manpower, Labor, Wages, Education, Economics, Tables.

This booklet is one of 14 providing detailed information about the labor surplus between the ages of 18 and 64 within groups of counties (subregions) of Arkansas in April 1960. The data the booklet contains can be used by public and private agencies working towards the economic growth that can lead to a more effective utilization of the labor surplus. With information about the size and characteristics of the labor surplus, public and private policy programs can be better designed to meet the specific needs of the underutilized.
PB-175 984 HC$3.00 MF$0.65

PIPEFITTING, PLUMBING HANDBOOK. ENGINEERED PERFORMANCE STANDARDS, PUBLIC WORKS MAINTENANCE.
Naval Facilities Engineering Command, Washington, D. C.
For primary bibliographic entry see Field 13K.
PB-175 985 HC$3.00 MF$0.65

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES RESEARCH GRANTS, PART I. BY GRANT NUMBER BY INVESTIGATOR.
National Inst. of General Medical Sciences, Bethesda, Md. Program Analysis Branch.
30 Jun 67, 230p
See also NIGMS Research Grants No. 2 - PB-175 987, NIGMS Research Grants No. 3 - PB-175 988, and NIGMS Training Grants - PB-175 989.

Descriptors: (*Medical research, Budgets), (*Medical personnel, Medical research), Tables, Costs.

The list of research grants provides information on the 1,875 awards which were 'active' on June 30, 1967, with a total funded value of $69.9 million. These awards represent 1,825 different projects--the difference between the number of awards and the number of projects results from the fact that supplements are listed separately and, for 50 projects, both a base grant and a supplement are shown. (Author)
PB-175 986 HC$3.00 MF$0.65

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES RESEARCH GRANTS, PART II. BY STUDY SECTION.

National Inst. of General Medical Sciences, Bethesda, Md. Program Analysis Branch.
30 Jun 67, 307p
See also NIGMS Research Grants No. 1 - PB-175 986, NIGMS Research Grants No. 3 - PB-175 988, and NIGMS Training Grants - PB-175 989.

Descriptors: (*Medical research, Budgets), (*Medical personnel, Medical research), Tables, Costs.

The list of research grants provides information on the 1,875 awards which were 'active' on June 30, 1967, with a total funded value of $69.9 million. These awards represent 1,825 different projects--the difference between the number of awards and the number of projects results from the fact that supplements are listed separately and, for 50 projects, both a base grant and a supplement are shown.
PB-175 987 HC$3.00 MF$0.65

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES RESEARCH GRANTS, PART III. BY INSTITUTION.
National Inst. of General Medical Sciences, Bethesda, Md. Program Analysis Branch.
30 Jun 67, 224p
See also NIGMS Research Grants No. 1 - PB-175 986, NIGMS Research Grants No. 2 - PB-175 987, NIGMS Training Grants - PB-175 989.

Descriptors: (*Medical research, Budgets), (*Medical personnel, Medical research), Tables, Costs.
PB-175 988 HC$3.00 MF$0.65

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES TRAINING GRANTS.
National Inst. of General Medical Sciences, Bethesda, Md. Program Analysis Branch.
1 Jul 67, 139p
See also NIGMS Research Grants No. 1 - PB-175 986, NIGMS Research Grants No. 2 - PB-175 987, NIGMS Research Grants No. 3 - PB-175 988.

Descriptors: (*Medical personnel, Training), Education, Costs, Medical research, Budgets, Tables.

Information is provided on training programs supported by the National Institute of General Medical Sciences as of July 1, 1967. The four basic tables include: (1) Training grants by grant number; (2) Training grants by program director; (3) Training grants by training committee and grant number; (4) Training grants by state, city, institution, and program director.
PB-175 989 HC$3.00 MF$0.65

MACHINE SHOP, MACHINE REPAIRS HANDBOOK. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.
Naval Facilities Engineering Command, Washington, D. C.
For primary bibliographic entry see Field 13I.
PB-175 995 HC$3.00 MF$0.65

ELECTRIC, ELECTRONIC FORMULAS. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.
Naval Facilities Engineering Command, Washington, D. C.
For primary bibliographic entry see Field 9C.
PB-176 052 HC$3.00 MF$0.65

AN INTENSIVE INVESTIGATION OF THE PROBLEMS ASSOCIATED WITH YOUNG MEN WHO ARE MENTALLY UNQUALIFIED FOR MILITARY SERVICE.
Research memo.
Research Triangle Inst., Durham, N. C.
2 Feb 67, 8p SU-225-2-Rev
Contract DL-81-32-31
See also PB-176 085 and PB-176 086.

Descriptors: (*Manpower studies, Bibliographies), (*Recruiting, Selection), Military requirements, Rehabilitation, Intelligence tests, Military medicine, Applied psychology.

The objective of the overall project is the development of an action program of rehabilitation so that young men who are mentally unqualified for military service can become active and productive members of society.
PB-176 084 HC$3.00 MF$0.65

AN INTENSIVE INVESTIGATION OF THE PROBLEMS ASSOCIATED WITH YOUNG MEN WHO ARE MENTALLY UNQUALIFIED FOR MILITARY SERVICE.
Research memo.
Research Triangle Inst., Durham, N. C.
24 Jun 66, 33p SU-225-3
Contract DL-81-32-31
See also PB-176 086; PB-176 084.

Descriptors: (*Manpower studies, Military requirements), (*Employment, *Wages), Population, Education, Labor, Training, Rehabilitation, Intelligence tests, Psychometrics.

The objective of the report is to learn more about the rejectee as a productive resource, as related to his mental ability, his employment experience, his earning capacity, his aspirations and motivations, and the factors that appear to be relevant to these characteristics.
PB-176 085 HC$3.00 MF$0.65

AN INTENSIVE INVESTIGATION OF THE PROBLEMS ASSOCIATED WITH YOUNG MEN WHO ARE MENTALLY UNQUALIFIED FOR MILITARY SERVICE.
Final rept.,
Research Triangle Inst., Durham, N. C.
A. M. Huq, T. H. Jerdee, J. D. Bates, and D. W. Jackson. 31 May 67, 170p SU-225
Contract DL-81-32-31
See also PB-176 084; PB-176 085.

Descriptors: (*Manpower studies, Military requirements), (*Medical examination, *Psychometrics), Education, Training, Employment, Wages, Rehabilitation, Motivation, Adjustment (Psychology), Aptitude tests.

The study was designed to accomplish two major purposes. One of these was to make recommendations on the methodology for a national study of mental rejectees. The other was to assess, within the limitations of a pilot study sample, the rejectees' vocational potentials, their problems of vocational adjustment, and their special needs for assistance. The aim was to extract from a pilot investigation as much information as possible, relevant to the development of programs for assistance.
PB-176 086 HC$3.00 MF$0.65

AN INTENSIVE INVESTIGATION OF THE PROBLEMS ASSOCIATED WITH YOUNG MEN WHO ARE MENTALLY UNQUALIFIED FOR MILITARY SERVICE.
Research memo.,
Research Triangle Inst., Durham, N. C.
Walter J. Matherly. 25 Oct 65, 49p RM-SU-225-1
Contract DL-81-32-31

Descriptors: (*Manpower studies, Military requirements), Education, Employment, Rehabilitation, Training, Recruiting, Economics, Department of Defense, Costs.

The educationally and economically handicapped rejectee qualifies for aid under a number of welfare and training programs of national scope. Those discussed here offer some direct assistance to the individual in creating the basic education and occupational skills necessary for acceptable performance in productive employment, and represent social resources of which the rejectees should be aware. These programs also should be carefully examined before designing any new action program.
PB-176 094 HC$3.00 MF$0.65

5J. Psychology (Individual and Group Behavior)

THE WINGSPREAD CONFERENCE: A CHALLENGE TO ACTION.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 13L.
AD-658 475 HC$3.00 MF$0.65

MECHANISM OF COLOR DISCRIMINATION: A BEHAVIORAL ANALYSIS.
Final progress rept. 1 Jan 64-1 Jan 67,
Massachusetts General Hospital Boston Stanley Cobb Labs for Psychiatric Research
Nancy K. Mello. 1 Jan 67, 9p
AFOSR-67-2140
Contract F44620-67-C-0027, Grant AF-AFOSR-544-65

Descriptors: (*Color vision, Behavior), Electrophysiology, Conditioned reflex, Cats, Pigeons, Learning, Visual perception, Thresholds (Physiology), Pattern recognition, Spectra (Visible + ultraviolet).

Studies were undertaken in order to delineate and analyze the following: (1) Spectral sensitivity capacities of the cat visual system, using several operant behavioral conditioning methods. Research was directed towards determining correlations between the sensory capacities of the cat as assessed behaviorally and electrophysiologically. (2) Analyzing the basis for inter-hemispheric reversal of left-right mirror-image patterns following monocular training in the pigeon. (Author)
AD-658 480 HC$3.00 MF$0.65

STUDIES IN PROBLEM SOLVING: SUBJECT 3 ON THE CRYPT-ARITHMETIC TASK DONALD + GERALD = ROBERT,
Carnegie-Mellon Univ Pittsburgh Pa Dept of Computer Science
Allen Newell. Jul 67, 171p
AFOSR-67-2169
Contract SD-146, Grant PHS-MH-07722-01

Descriptors: (*Programming languages, *Data processing systems), (*Problem solving, *Performance (Human)), Game theory, Reasoning, Symbols, Topology, Graphics, Decision making, Computer programs, Verbal behavior, Simulation.

The behavior of a single subject on a symbolic task (crypt-arithmetic) is examined in some detail. The study is part of a continuing effort to understand the information processes involved in problem solving. Following a brief review of the advantages and difficulties in using protocols to aid in protocol analysis. These are essentially descriptive in nature, consisting in a specification of the problems space in which the subject is working, and in a display of his behavior, of the total behavior in a series of decision points, and permits an analysis of the adequacy of the productions (essentially, a system of conditional statements). A rather extensive analysis of the adequacy of the production system is included. Finally, there is some discussion of the implications of the production system, not only as a descriptive tool, but as a theoretical scheme.
AD-658 485 HC$3.00 MF$0.65

AN INFORMATION PROCESSING THEORY OF HUMAN DECISION MAKING UNDER UNCERTAINTY AND RISK,
Carnegie Inst of Tech Pittsburgh Pa
Nicholas V. Findler. 27 Jul 64, 62p
AFOSR-67-2129
Contract SD-146

Descriptors: (*Decision making, Mathematical models), Programming (Computers), Uncertainty, Information theory, Behavior, Performance (Human), Verbal behavior.
Identifiers: Information processing (Psychology).

Computer-based experiments were made to observe and record the verbal behavior of subjects making decisions in quantitative task environments under uncertainty and risk. The second phase of the projects consists of generating a psychological theory of the above behavior, in the form of a computer program. Comparing the trace of the program with tape recorded protocols may indicate the level of completeness of the theory. (Author)
AD-658 486 HC$3.00 MF$0.65

MULTIMODE FACTOR ANALYSIS OF INTERPERSONAL PERCEPTIONS.
Technical rept.,
Illinois Univ Urbana Group Effectiveness Research Lab
Earl E. Davis, and Nadine Natker Grobstein.
Dec 66, 46p Rept no. TR-36
Contract Nonr-1834 (36), ARPA Order-454
Rept. on Communication, Cooperation and Negotiation in Culturally Heterogeneous Groups.

Descriptors: (*Perception (Psychology), Factor analysis), (*Group dynamics, Perception (Psychology)), Social psychology, Attitudes, Behavior, Verbal behavior, Culture, Social communication, Semantics.

Data resulting from the interpersonal perceptions of 88 students who were heterogeneous with respect to race and sex were subjected to a variety of analyses, including Tucker's three-mode factor analysis procedure. Ss responded on Semantic and Behavioral Differential scales to complex person stimuli designated in terms of race, sex, and other characteristics which formed a factorial design. The data were reduced to a two-way classification of scales-by-stimuli, using Ss' mean group responses, and conventional factor analyses of scales were performed. Analyses of variance were carried out to determine the relative weights of the stimulus factors in determining the responses of the various groups of Ss on the scale factors. Finally, the three modes of the data classified in terms of scales-by-stimuli-by-subjects were subjected to Tucker's three-mode factor analysis. After obtaining principal axis factors for the three modes, the scale and subject mode factors were rotated by Varimax and the stimulus mode factors were transformed by means of discriminant function analysis. Counter-rotations of the three modes yielded a core matrix linking the scale factors to the stimulus factors. Although not all of the subject types were clearly interpretable in the present study, this type of analysis, with some modifications, would appear to have great potential value in treating complex interpersonal perception data. (Author)
AD-658 515 HC$3.00 MF$0.65

MILITARY PSYCHIATRY: A PROTOTYPE OF SOCIAL AND PREVENTIVE PSYCHIATRY IN THE UNITED STATES,
Walter Reed Army Inst of Research Washington D C
For primary bibliographic entry see Field 6E.
AD-658 609 Not available from CFSTI.

CROSS-MODALITY ESTIMATION OF ANGULAR VELOCITY.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6S.
AD-658 657 HC$3.00 MF$0.65

MOLECULAR NEUROCHEMISTRY OF RAT BRAIN DURING WATER MAZE PERFORMANCE.
Research rept.,
York Univ Toronto (Ontario) Molecular Psychobiology Lab
John Gaito, Joanne Rigler, and James Mottin. 25 Jul 67, 22p Rept no. MPL-9
Contract Nonr-4935 (00)
Research supported in part by National Research Council of Canada, Ottawa (Ontario).

Descriptors: (*Learning, Brain), Central nervous system, Cerebral cortex, Psychophysiology, Behavior, Water, Rats, Desoxyribonucleic acids, Ribonucleic acids, Proteins, Tissues (Biology), Canada.
Identifiers: Molecular psychobiology.

Four experiments were conducted with a six unit water T maze learning task. The main brain tissues showing differences between learning and non-learning animals were the anterior dorsal cortex and the medial ventral cortex. The former probably reflects the motor activity, the swimming, required in the maze; the latter, either the learning process or the effects of the stressful situation. The results of these experiments are compared to those obtained earlier in shock avoidance experiments; the medial ventral cortex consistently shows differences between learning and nonlearning rats. (Author)
AD-658 723 HC$3.00 MF$0.65

A CRITERION MODEL FOR THE STUDY OF INTERPERSONAL RELATIONS IN SMALL ISOLATED GROUPS,
Illinois Univ Urbana
Joseph E. McGrath. 1967, 36p

Descriptors: (*Group dynamics, *Military personnel), (*Adjustment (Psychology), Performance (Human)), Perception (Psychology), Interactions, Predictions, Personality, Environment, Behavior, Attitudes, Probability.

Report concentrates on those aspects of the group's task which have to do with maintaining effective members and an intact group. Group task activities directly instrumental to mission performance and physical survival are so obviously important that they have received far more attention in past research -- and indeed, in the effort of this workgroup -- than has been given to problems of interpersonal relations and member adjustment. The purpose of this paper is to explore some of the problems involved in formulation of a criterion system for investigation of interpersonal relations and individual adjustment in small, isolated military groups.
AD-658 736 HC$3.00 MF$0.65

PAIRED-ASSOCIATE TRANSFER FOR THE A-B, C-A AND THE A-B, B-C PARADIGMS,
George Washington Univ Alexandria Va Human Resources Research Office
Richard M. Schulman. 24 Apr 67, 11p Rept no. Professional paper-38-67
Availability: Published in Psychological Reports v20 n3 Pt2 p1043-50 Jun 1967.

Descriptors: (*Word association, Transfer of training), Learning, Verbal behavior, Performance (Human), Statistical analysis.

Results of two experiments on transfer between paired-associate verbal lists, the first comparing the A-B, C-A paradigm with the A-B, C-D control and the second comparing the A-B, B-C paradigm with the A-B, C-D control are reported here. Each paradigm was represented by a separate group of 20 Ss, making a total of 80 Ss participating in both experiments. Army enlisted men averaging around the civilian mean were the nonvolunteer Ss. A low degree of List I learning was used but List II was learned to one perfect trial. Trials to successive criteria showed non-significant negative transfer in Exp. II and nonsignificant positive transfer in Exp. I. When the upper halves of Ss of known general aptitude in the two groups in Exp. I were compared, positive transfer was barely significant ($p = .05$). (Author)
AD-658 752 Not available from CFSTI.

CATEGORY SCALING JUDGMENT TESTS ON MOTOR VEHICLE AND AIRCRAFT NOISE.
Technical rept.,
Bolt Beranek and Newman Inc Van Nuys Calif
Karl S. Pearsons, and Richard D. Horonjeff. Jul 67, 115p Rept no. BBN-1516
FAA-DS-67-8
Contract FA-65-WA-1260

Descriptors: (*Noise, *Psychometrics), Airplane noise, Vehicles, Engine noise, Perception (Psychology), Acceptability.

Subjects were asked to rate on various adjective category scales the sounds produced by aircraft flyovers and motor vehicle drivebys. Recorded sounds were rated by college students and community residents at locations near a highway and two airports. The laboratory tests indicated that all of the category scales were similar in their relationship with acoustical measures, although, in general, the noisiness scale exhibited the highest correlation. The correlations between the noisiness scale and various acoustical measures for the laboratory and field tests were all about equal, with perceived noise level, calculated or estimated from N-level measurements, exhibiting the highest correlation, followed by loudness level and A-level. The lowest correlation was exhibited by overall sound pressure level. Both the laboratory and field results were in good agreement and indicated little difference in ratings vs level among various sound stimuli employed during the tests. Agreement was good with the results of other investigators at the highest levels, diverging at the more moderate levels. These comparisons indicate the influence of stimulus range on the magnitude and slope of the relationship between the subjective rating vs a physical noise measure. (Author)
AD-658 755 HC$3.00 MF$0.65

THE OM SCALE: A COMPARATIVE SOCIO-PSYCHOLOGICAL MEASURE OF INDIVIDUAL MODERNITY,
Harvard Univ Cambridge Mass
David Horton Smith, and Alex Inkeles. 1966, 27p

AFOSR-67-2205
Grant AF-AFOSR-1094-66
Availability: Published in Sociometry v29 n4 p353-77 Dec 1966.

Descriptors: (*Attitudes, Psychometrics), (*Urban areas, Attitudes), Sociology, Behavior, Education.

Attitudinal modernity may be defined as a set of attitudes, beliefs, behavior, etc. especially characterizing persons in highly urbanized, highly industrialized, and highly educated social settings. Over 150 interview items attempting to measure modernity so defined were administered as part of a four hour interview to 5,500 men from 6 different developing countries--Argentina, Chile, India, Pakistan, Israel and Nigeria. Using a subset of 119 strictly attitudinal items, the paper attempts to derive a simple, comparative, overall measure of the modernity of individuals. The resulting measure was called 'OM,' standing for 'Overall Modernity.' Two major types of OM measures were derived, one using item analysis methods and one using criterion group methods. The final short OM scale suggested consists of items meeting both selection procedures simultaneously. (Author)
AD-658 806 Not available from CFSTI.

ON THE ANALYSIS OF HUMAN PROBLEM SOLVING PROTOCOLS,
Carnegie-Mellon Univ Pittsburgh Pa Dept of Computer Science
Allen Newell. 27 Jun 66, 66p
AFOSR-67-2204
Contract SD-146, Grant PHS-MH-07722-02

Descriptors: (*Problem solving, Analysis), Verbal behavior, Simulation, Reaction (Psychology), Reasoning, Decision making, Psychometrics, Theory.
Identifiers: Information processing (Psychology).

The last decade has seen the emergence of information processing theories of human problem solving, expressed usually as computer programs that simulate behavior. These theories have led to a resurgence of interest in protocols as a source of data, meaning the continuous verbal behavior of the subject operating under instructions to 'think aloud'. The purpose of the paper is to discuss the analysis of protocol data and to suggest one new line of attack for strengthening it. The intent is somewhat methodological, but some new material is introduced. (Author)
AD-658 863 HC$3.00 MF$0.65

RECIPROCITY AND CREDIT BUILDING IN DYADS.
Technical rept.,
State Univ of New York Buffalo Dept of Psychology
Dean G. Pruitt. 1 Jun 67, 21p Rept no. TR-1
Contract N00014-67-C-0190

Descriptors: (*Motivation, Group dynamics), (*Group dynamics, Psychometrics), Attitudes, Reaction (Psychology), Game theory, Social psychology.
Identifiers: Reciprocity (Psychology).

Four hypotheses, based on Gouldner's theory of reciprocity, were tested in an experimental gaming situation, with the following results: More reward was provided to the other person, (a) the more he had given in the past, (b) the larger his future resources, and (c) the smaller his past resources (both with his past level of giving and his past percentage of giving held constant). No interaction was found between past experience with the other person and the size of his future resources. (Author)
AD-658 880 HC$3.00 MF$0.65

PROGRAMMED CONTROL OF PURPOSIVE MOVEMENT.
Tulane Univ Covington La Delta Regional Primate Research Center
For primary bibliographic entry see Field 6C.
AD-658 888 HC$3.00 MF$0.65

SPECIAL PROBLEMS IN THE ESTIMATION OF BEARING.
Johns Hopkins Univ Baltimore Md
For primary bibliographic entry see Field 17C.
AD-658 891 HC$3.00 MF$0.65

RESPONSE SELECTION IN KEEPING TRACK OF SEVERAL THINGS AT ONCE.
Meeting speech,
Massachusetts Inst of Tech Lexington Lincoln Lab
D. B. Yntema, and G. M. Schulman. 1967, 9p
Rept no. MS-1741
ESD-TR-67-332
Contract AF 19 (628)-5167
Availability: Published in Acta Psychologica v27 p316-24 1967.

Descriptors: (*Memory, Multiple operation), (*Reaction (Psychology), Selection), Analysis of variance, Performance tests.

Keeping track of the current states of several variables has been found to be more difficult when the states of all varibles are drawn from the same category than when the states of different variables are drawn from different categories. The experiment rejected some alternative explanations and concluded that S's superior performance in the case of different categories may be ascribed entirely to response selection: when there are different categories, he can sometimes dismiss a tentative response as impossible. Harris' Discriminant Rule was found to give an adequate quantitative description of the effect of constraining S's response in this way. (Author)
AD-658 900 Not available from CFSTI.

REACTION SYSTEMS AND INSTABILITY IN INTERPERSONAL AND INTERNATIONAL AFFAIRS.
Technical rept.,
State Univ of New York Buffalo Dept of Psychology
Dean G. Pruitt. 1 Jul 67, 44p Rept no. TR-2
Contract N00014-67-C-0190
Rept. on Studies of the Dynamics of Cooperation and Conflict.

Descriptors: (*Foreign policy, Stability), (*Reaction (Psychology), *Behavior), Sequences, Deterrence, Costs, Decision making, Organizations, Group dynamics, Psychometrics, Learning, Predictions, Reasoning, Political science, Attitudes.

The paper concerns the effect of one party's behavior on another's. Change in one party's level of output on a given dimension often produces reciprocal change in the other party's level of output on the same or another dimension. Reciprocal changes are sequenced in various ways: e.g., in the form of vicious or benevolent circles, which move more or less rapidly, and sometimes slow down and stop or even reverse direction. A geometrical formulation may be useful for interpreting these various sequences. A variety of reaction functions can be plotted, which show the level of output on any dimension emitted by one party in response to the other party's level of output on the same or another dimension. When both party's reaction functions are presented in the same space, a reaction system emerges. One such system, consisting of two S-shaped curves may be useful for interpreting the concept of 'instability' in the theory of international relations. This system has two equilibrium points, a lower 'peaceful' one and an upper 'conflictful' one. The system also has two points of no return. If the relationship between the parties is at one equilibrium point, and a momentary (temporary) force moves one or both parties over a point of no return for a long enough period, the relationship will move to the other equilibrium point, despite the subsequent abatement of the momentary force. Hence, one interpretation of 'instability' is the closeness of the points of no return to the equilibrium point that is currently occupied.
AD-658 901 HC$3.00 MF$0.65

FORMATION OF CONCEPTS,
Michigan Univ Ann Arbor Dept of Psychology
Edwin Martin. 1967, 37p Rept no. 05823-38-J
AFOSR-67-2221
Contract AF 49 (628)-1235
Availability: Published in Concepts and Structure of Memory Chap-2 p33-67 1967.

Descriptors: (*Learning, Theory), Conditioned reflex, Reaction (Psychology), Inhibition, Reflexes.
Identifiers: Concept formulation studies.

An account of how concepts are formed is given within conditional-reflex theory. The argument begins with generalization, passes through discrimination learning, and shows a concept to be 'a set of mutually induced response tendencies.' Discrimination-learning and reaction-time literature is cited in support. A new, confirming experiment is reported. (Author)
AD-658 925 Not available from CFSTI.

DECISION PROCESSES IN RETRIEVAL FROM MEMORY: COMMENT ON THE CONTRIBUTIONS OF LLOYD R. PETERSON AND CHARLES N. COFER,
Michigan Univ Ann Arbor Dept of Psychology
Arthur W. Melton. 1967, 13p Rept no. 05823-40-J
AFOSR-67-2232
Contract AF 49 (638)-1235
Availability: Published in Concepts and the Structure of Memory p215-25 1967.

Descriptors: (*Recall, *Decision making), Memory, Selection, Learning, Reaction (Psychology).

The idea that retrieved response alternatives are 'edited' prior to emission of one of them is discussed. The need for such a decision mechanism is defended. However, two points are made: (1) that there is danger in assuming an invariant process over a heterogeneous set of learning and memory tasks; and (2) theorists, in the face of proposed editing process, must not lose sight of the origin of the implicit responses that are to be edited. The stimulating circumstances play an immense role, not only in what responses are retrieved, but also in how discriminable they are among themselves. (Author)
AD-658 926 Not available from CFSTI.

ABSOLUTE RECOVERY OF FIRST-LIST RESPONSES FROM UNLEARNING DURING 26 MINUTES FILLED WITH AN EASY OR DIFFICULT INFORMATION PROCESSING TASK,
Michigan Univ Ann Arbor Dept of Psychology
Arthur W. Melton, and Richard Kammann. 1967, 4p Rept no. 08773-5-J
AFOSR-67-2233
Contract AF 49 (638)-1235
Prepared in cooperation with Oakland Univ., Rochester, Mich.
Availability: Published in Proceedings of the Annual Convention, American Psychological Association (75th), Washington, D. C. p63-4 2-6 Sept 1967.

Descriptors: (*Retention, Interference), (*Learning, Performance tests), Recall, Analysis.
Identifiers: Information processing (Psychology).

Absolute spontaneous recovery of List-1 responses during a 26 min. retention interval after learning an interfering List-2 was demonstrated. This evidence supports the two-factor theory of retroactive interference. (Author)
AD-658 928 Not available from CFSTI.

PERCEPTUAL DEFICIT DURING A MENTAL TASK,
Michigan Univ Ann Arbor Dept of Psychology
Jackson Beatty, Irwin Pollack, and Daniel Kahneman. 31 Mar 67, 4p Rept no. 08773-4-J
AFOSR-67-2234
Contract AF 49 (638)-1235
Prepared in cooperation with Harvard Univ., Cambridge, Mass., and Michigan Univ., Ann Arbor. Mental Health Research Inst.
Availability: Published in Science v157 n3785 p218-9 Jul 14 1967.

Descriptors: (*Visual perception, Attention), (*Reasoning, Visual perception), Interference, Inhibition, Responses.

Subjects monitored for a visual signal while engaged in a demanding mental task. The probability of detecting the signal depends on the time of its presentation during the 8 seconds of the task. A similar time course is observed for failures to detect and for changes of pupil size. Momentary vari-

ations in the load that the task imposes on the subject are reflected in both indices. Detection failures are not explained by the pupillary changes. (Author)
AD-658 930 Not available from CFSTI.

SENTENCE LENGTH AND SENTENCE RETENTION IN THE FREE-LEARNING SITUATION,
Michigan Univ Ann Arbor Dept of Psychology
Edwin Martin, and Kelyn H. Roberts. 1967, 4p
AFOSR-67-2235
Contract AF 49 (638)-1235
Availability: Published in Psychonomics Science v8 n12 p535-6 1967.

Descriptors: (*Recall, Grammars), (*Learning, Grammars), Retention, Syntax, Achievement tests.

The hypothesis that sentence length is not a significant factor in sentence recall was tested and rejected. The lengths studied were 5, 7, and 9 words. All sentences were of the active-affirmative type. A structural-complexity factor was found to play no role in recall. (Author)
AD-658 932 Not available from CFSTI.

THE MODERNIZATION OF MAN,
Harvard Univ Cambridge Mass Center for International Affairs
Alex Inkeles. 1966, 16p
AFOSR-67-2206
Grant AF-AFOSR-1094-66
Availability: Published in Modernization chap 10 p138-50 1966.

Descriptors: (*Humans, *Attitudes), Environment, Urban areas, Education, Management engineering, Behavior, Economics, Political science, Communication systems, United States government.

What is the modern man, and what makes him what he is. The answer to this question is inevitably controversial, and almost no one enters on a discussion of it without arousing a good deal of emotion. The reasons are not hard to find. In the first place, the change from more traditional to more modern qualities in man often means someone must give up ways of thinking and feeling that go back decades, sometimes centuries; and to abandon these ways often seems to be abandoning principle itself. For another thing, the qualities that make a man modern often do not appear to be neutral characteristics that any man might have, but instead represent the distinctive traits of the European, the American, or the Westerner that he is bent on imposing on other people so as to make them over in his own image. In the third place, many of the characteristics that are described as modern, and therefore automatically desirable, in fact are not very useful or suitable to the life and conditions of those on whom they are urged or even imposed. The characteristic mark of the modern man has two parts: one internal, the other external; one dealing with his environment, the other with his attitudes, values, and feelings.
AD-658 956 Not available from CFSTI.

THE SCALING OF EFFORT PRODUCED BY STRENOUS ISOMETRIC MUSCLE CONTRACTIONS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6P.
AD-658 979 HC$3.00 MF$0.65

EFFECTS OF THIOPENTAL SEDATION ON LEARNING AND MEMORY.
Revised ed.,
Stanford Univ Calif Dept of Psychology
Ernest R. Hilgard, Anne G. Osborn, John P Bunker, Leslie M. Cooper, and Gilbert S. Frank. 29 May 67, 6p
AFOSR-67-2214
Contract AF 49 (638)-1436, Grant PHS-GM-12527
Revision of manuscript submitted 6 Mar 67. Prepared in cooperation with Brigham Young Univ., Provo, Utah. Dept. of Psychology, and Iowa Univ., Iowa City. Div. of Electroencephalography and Neurophysiology.
Availability: Published in Science v157 n3788 p574-6 Aug 4 1967.

Descriptors: (*Memory, Hypnotics + sedatives), (*Learning, Hypnotics + sedatives), (*Hypnotics + sedatives, Psychophysiology), (*Barbiturates, Psychophysiology), Psychotropic agents, Recall, Hypnosis, Electroencephalography.

Subjects who were administered thiopental showed a loss of memory for events discussed while they were under sedation. The subjects were tested for recognition memory of pictures and recall of associated pairs of letters and words, and found that the subsequent memory loss was correlated with the concentration of thiopental in the venous blood at the time the material was learned. Retention did not appear to be state-dependent because the subject, while under sedation, could recall material learned prior to sedation, and because recall was not facilitated by reinstatement of the sedation. (Author)
AD-659 018 Not available from CFSTI.

A QUANTITATIVE STUDY OF PAIN AND ITS REDUCTION THROUGH HYPNOTIC SUGGESTION,
Stanford Univ Calif Dept of Psychology
Ernest R. Hilgard. 1967, 9p
AFOSR-67-2212
Contract AF 49 (638)-1436, Grant PHS-MH-3859
Availability: Published in Proceedings of the National Academy of Sciences v57 n6 p1581-6 Jun 1967.

Descriptors: (*Pain, Measurement), (*Hypnosis, Pain), Thresholds (Physiology), Sensation (Physiology), Reflexes.

The measurement of suprathreshold pain by means of circulating ice water stimulation and verbal reports of felt pain yields orderly results, capable of quantitative analysis. While hypnosis demonstrably can reduce laboratory pain as well as clinical pain, the physiological basis of this reduction is obscure. Because reflex measures, such as heart rate and breathing, are very insensitive relative to verbal reports, it is probable that the changes that occur are in the higher neural centers concerned with attention and alterations in consciousness. (Author)
AD-659 021 Not available from CFSTI.

EFFECTS OF DOSE AND OF PARTIAL-BODY EXPOSURE ON CONDITIONING THROUGH A RADIATION-INDUCED HUMORAL FACTOR,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 6R.
AD-659 028 HC$3.00 MF$0.65

QUALITY AND QUANTITY OF CONTRIBUTIONS AS DETERMINANTS OF PERCEIVED ABILITY.
Technical rept.,
State Univ of New York Buffalo Dept of Psychology
C. Robert Regula, and James W. Julian. Jul 67, 17p Rept no. TR-6
Contract Nonr-4679 (00)

Descriptors: (*Leadership, Perception (Psychology)), (*Verbal behavior, Personality), Group dynamics, Creativity.

The importance of talkativeness or the relative frequency of contributing to task interaction was examined as a factor which determines person perception. Both the quality and frequency of comments made in a two-person interaction were controlled by using experimental confederates who performed prescribed roles. Quantity but not quality of task contributions was significantly related to the attribution of creativity, and influence over others. (Author)
AD-659 039 HC$3.00 MF$0.65

REACTIONS TO THE GROUP SPOKESMAN AS INFLUENCED BY HIS PERCEIVED COMPETENCE, SOURCE OF AUTHORITY, AND TASK SUCCESS.
Technical rept.,
State Univ of New York Buffalo Dept of Psychology
James W. Julian, Edwin P. Hollander, and C. Robert Regula. Aug 67, 25p Rept no. TR-7
Contract Nonr-4679 (00)

Descriptors: (*Leadership, Perception (Psychology)), Group dynamics, Attitudes, Performance (Human), Psychometrics.

136 men from the AFROTC met as members and spokesmen in 4-person discussion groups. These groups were distributed in a 2x2x2 factorial design, which varied the perceived competence, source of authority, and success of the spokesman. As hypothesized, reactions to the spokesman differed as a function of all three factors, with the more competent and successful spokesman endorsed more strongly than the less competent and unsuccessful spokesman. The spokesman's source of authority, whether elected or appointed, interacted with both perceived competence and success to determine member endorsement. In addition, the elected spokesman was perceived somewhat more positively than the appointed spokesman. These results point to the important effects of legitimizing mechanisms in shaping group member willingness to support the leader in his role as spokesman for the group. (Author)
AD-659 040 HC$3.00 MF$0.65

EFFECTS OF RACE OF TESTER, APPROVAL-DISAPPROVAL AND NEED ON NEGRO CHILDREN'S LEARNING.
Technical rept.,
Michigan Univ Ann Arbor
Irwin Katz, Thomas Henchy, and Harvey Allen. Apr 67, 14p Rept no. TR-2
Contract N00014-67-A-0181-0004
Prepared in cooperation with New York Univ., N. Y.

Descriptors: (*Learning, *Attitudes), Culture, Motivation, Instructors, Students, Perception (Psychology), Reaction (Psychology), Achievement tests.
Identifiers: Negroes.

It was found that northern urban Negro boys of grade school age performed better on a verbal learning task with Negro examiners than with white examiners, and when given approval rather than disapproval. In addition, the strength of the child's need for approval influenced his reactions to the first two variables in combination. The experiment indicates that in order to understand the effects of positive and negative social reinforcement on verbal learning in Negro pupils it is necessary to take into account the need state of the individual child and the racial identity of the adult dispenser of reinforcement. (Author)
AD-659 052 HC$3.00 MF$0.65

THE EVOLUTION OF PERCEPTUAL FRAMES OF REFERENCE.
Technical repts.,
Johns Hopkins Univ Baltimore Md Dept of Psychology
William Bevan. Aug 67, 44p Rept no. TR-49-52
Contract N000140670A-0163-0001

Prepared in cooperation with Kansas State Univ. Manhattan, Contract Nonr-3634 (01).

Descriptors: (*Stimulation, *Perception (Psychology)), Reflexes, Reaction (Psychology), Effectiveness.
Identifiers: Frames of reference.

The effect of applying shock, either to the feet or to the brain, prior to operant testing upon rate of responding for positive intracranial stimulation was studied in 29 animals. The pre-test shock was applied to some Ss in a setting closely resembling the operant chamber, to others in a markedly dissimilar setting. A control group never received prior shock. Both types of prior shock produced a facilitation of self-stimulation rate, which was identified as an instance of qualitative reinforcement contrast. However, the overall time course for this effect varied with type of pre-test shock: for foot-shock it was enhanced from beginning to end of the average session; for brain-shock it decreased. Pre-test shock also appeared to be more effective when administered in a similar than in a dissimilar chamber. (Author)
AD-659 058 HC$3.00 MF$0.65

THE MATHEMATICAL STRUCTURE AND IMPLICATIONS OF GHISELLI'S MODERATOR VARIABLE.
Technical rept.,
Illinois Univ Urbana Dept of Psychology
Anthony J. Conger. Aug 67, 36p
Contract N00014-67-A-0305-0003
Report on proj. 'Techniques for Investigation of Structure of Individual Differences in Psychological Phenomena.'

Descriptors: (*Behavior, Mathematical prediction), Regression analysis, Analysis of variance, Psychometrics, Correlation techniques.

A mathematical model for Ghiselli's moderator variable and index of predictability is developed. From this mathematical structure, conclusions and implications are drawn, concerning the use of moderators in multiple regression and suppression. In addition, guides are given as to when and where to look for moderators. Finally, the structure is related to Wiggins' 'components of variance' in order to show how moderator and index of predictability situations might arise. Demonstrations of several of the conclusions are attempted and reasons are given for their failure. (Author)
AD-659 059 HC$3.00 MF$0.65

EVALUATION OF FACTOR ANALYTIC RESEARCH PROCEDURES BY MEANS OF SIMULATED CORRELATION MATRICES.
Technical rept.,
Illinois Univ Urbana Dept of Psychology
Ledyard R. Tucker, Raymond F. Koopman, and Robert L. Linn. Jul 67, 125p
Contracts Nonr-1834 (39), N00014-67-A-0305-0003
Report on proj. 'Techniques for Investigation of Structure of Individual Differences in Psychological Phenomena'. Prepared in cooperation with Simon Fraser Univ., and Educational Testing Service.

Descriptors: (*Psychometrics, *Factor analysis), Probability, Models (Simulations), Matrix algebra, Correlation techniques, Mathematical models, Random variables, Real numbers, Tables, Computers, Input-output devices, Problem solving, Effectiveness.

Since the effectiveness of a method of data analysis in revealing underlying influences in observations depends on the validity of the structural model on which the data analysis is based, evaluative studies of data analysis methods are needed in which the methods are applied to bodies of data for which desired results are known. With knowledge of desired results, the validity of a data analysis method may be ascertained by a comparison of the actual results with the desired results. In the area of factor analysis, desired results from bodies of actual data are seldom known. To solve this problem, a procedure was developed for computing correlation matrices which are more similar to real data correlation matrices than are correlation matrices computed from the factor analysis structural model. The correlation matrices computed by the new procedure are termed simulated correlation matrices. They have the desirable property of being developed from known input, against which results from analyses of the matrices may be evaluated. In the present investigation, three methods of factor extraction were studied as applied to 54 simulated correlation matrices.
AD-659 060 HC$3.00 MF$0.65

RELATIONSHIPS BETWEEN SENSITIVITIES OF BLOOD-VOLUME CHANGE, PULSE-VOLUME CHANGE, AND THE GSR.
Technical rept.,
Indiana Univ Bloomington
Yvette Gagnon, and John J. Furedy. Sep 67, 16p
Rept no. TR-20
Contract Nonr-908 (15)
Prepared in cooperation with Toronto Univ. (Ontario).

Descriptors: (*Responses, Measurement), (*Reflexes, Measurement), (*Blood pulse, Responses), (*Blood volume, Responses), Psychophysiology, Reaction (Psychology), Sensitivity, Stimulation.
Identifiers: Plethysmography.

The records of 62 Ss run under a classical differential conditioning arrangement with shock as UCS and tones and lights as CS were measured in order to examine two assumptions: (a) blood-volume (BV) and pulse-volume (PV) change are indices of the same autonomic process, and (b) they are equally sensitive. The former assumption was supported by the findings that the BV-PV intercorrelations were all higher than any of the correlations between either BV or PV and the GSR. The latter assumption was confirmed by the findings that BV and PV were equally effective in detecting a number of stimulus contrasts, when, as in the present study, the two measures were obtained from separately coupled tracings. The results, in addition to suggesting that the two plethysmographic measures are substitutable alternatives, also indicated that the GSR is a reliably more sensitive index of stimulation than either BV or PV. (Author)
AD-659 063 HC$3.00 MF$0.65

ANNUAL ARMY HUMAN FACTORS RESEARCH AND DEVELOPMENT CONFERENCE (12th) HELD AT THE U. S. ARMY INFANTRY CENTER, FORT BENNING, GEORGIA, 2-5 OCTOBER 1966.
Office of the Chief of Research and Development (Army), Washington, D. C.
For primary bibliographic entry see Field 5E.
AD-805 030 HC$3.00 MF$0.65

STUDY OF ASTRONAUT CAPABILITIES TO PERFORM EXTRAVEHICULAR MAINTENANCE AND ASSEMBLY FUNCTIONS IN WEIGHTLESS CONDITIONS.
Airesearch Mfg. Co., Los Angeles, Calif.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 21.
N67-36491 HC$3.00 MF$0.65

5K. Sociology

THINKING ABOUT FUTURE SOCIAL DEVELOPMENT,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-658 423 HC$3.00 MF$0.65

CONSUMPTION COOPERATION IN RURAL AREAS IN THE USSR: A COMMENT,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5C.
AD-658 425 HC$3.00 MF$0.65

TECHNOLOGICAL CHANGE AND PUBLIC ADMINISTRATION.
Professional paper,
System Development Corp Santa Monica Calif
Thomas C. Rowan. 15 Aug 67, 20p Rept no. SP-2817
Presented at the 1967 Conference of the American Society for Public Administration, San Francisco, March 1967.

Descriptors: (*Data processing systems, Sociology), (*Sociology, *Systems engineering), Decision making, Transportation, Air pollution, Education, Lasers, Time sharing, Management planning.
Identifiers: Innovation (Technology), Privacy.

The rapidly accelerating rate of technological change is discussed in relation to social goals. The impact of scientific and technological developments are affecting the quality of life sooner and more intensely than ever before. Techniques for facilitating change and example of two areas of technology, communication and information processing, as they impact on public administration are discussed. Developments in concepts, hardware, information management techniques and some problem areas for decision makers are specified. (Author)
AD-658 473 HC$3.00 MF$0.65

APPLICATIONS OF COMPUTERS IN EDUCATION.
Professional paper,
System Development Corp Santa Monica Calif
Harry F. Silberman. 29 Aug 67, 18p Rept no. SP-2909/000/01
Presented at the American Management Association Conference, Americana Hotel, New York, August 9, 1967.

Descriptors: (*Education, Computers), (*Time sharing, *Man-machine systems), Programming (Computers), Digital computers, Computer programs, Performance (Human), Input-output devices, Cost effectiveness.
Identifiers: Computer-aided instruction.

Four areas of computer applications to education are described: (1) the computer as a subject of instruction; (2) as a tool of instruction; (3) as a research and development tool; and (4) as a management tool. These applications are viewed in the context of an operational time-sharing system connecting many schools with a central computer. Three problem areas in implementing such a system are discussed: (1) man-machine communication; (2) cost-effectiveness; and (3) user acceptance. (Author)
AD-658 476 HC$3.00 MF$0.65

CAVEAT EMPTOR SYSTEMATIBUS (LET THE BUYER OF SYSTEMS BEWARE).
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-658 481 HC$3.00 MF$0.65

AN ETHICAL AND MORAL ANALYSIS OF THE DESIGN FOR A MAN-MACHINE COUNSELING SYSTEMS: REACTIONS BY A UCLA GRADUATE CLASS IN COUNSELING.
Professional paper,
System Development Corp Santa Monica Calif
B. A. Rosenquist, J. F. Cogswell, D. P. Estavan, and C. P. Donahoe, Jr. 9 Jun 67, 71p Rept no. SP-2874/000/00

Descriptors: (*Sociology, *Man-machine systems), (*Education, Data processing systems),

Students, Computers, Behavior, Information retrieval, Control, Scheduling, Programming (Computers).
Identifiers: Counseling.

In the design of a man-machine counseling system, the project staff has become more and more concerned about two key objectives. One is to find ways to make school counseling more humanized, using the computer, if possible, as one of numerious means to that end. A second is to develop procedures or processes for system design, development and implementation that are humanistic. One attempt in this direction was to have the counselors from the schools participate in design workshops with the System Development Corporation Staff in formulating the system design. A number of design ideas emerged from these sessions. However, the ideas were primarily oriented to ways in which the computer might be used to assist the counselor. Little emphasis was placed on determining how the counselors might use their newly-found time to help students--or on discovering whether the system, as planned, might even be deterimental to the interests of the student. The opportunity to explore these problems further came in the form of an invitation from UCLA for SDC to participate in teaching a graduate class on moral and ethical considerations in counseling. This document is a compilation of quotations from 16 of the 19 students' term papers examining the design of the man-machine couseling system, giving particular emphasis to evaluating the system from a moral and ethical standpoint. In analyzing these papers, an attempt was made to categorize all the content under major headings. (Author)
AD-658 482 HC$3.00 MF$0.65

JAPANESE COLONIZATION IN EASTERN PARAGUAY,
National Academy of Sciences-National Research Council Washington D C Foreign Field Research Program
Norman R. Stewart. 1967, 218p
NAS-NRC-Pub-1490
Availability: Hard copy available from National Academy of Sciences, Printing and Publishing Office, 2101 Constitution Ave., Washington, D. C., 20418, $7.75.

Descriptors: (*South America, Sociology), Geography, Climatology, Plants (Botany), Soils, Ecology, Rural areas, Population, Culture, Economics, Political science.
Identifiers: Paraguay, Japanese people, Immigration.

Contents: The physical fundament in eastern Paraguay (landforms and hydrography, climate, vegetation, soils, fauna); Cultural geographic survey of rural Paraguay (population, origins of Paraguayan national culture, settlement and structure patterns, livelihood patterns, the national economy, the socio-political milieu); La Colmena - an example of cultural landscape in Japanese colonies (site and situation, development of the colony, the settlement pattern, structure patterns, livelihood patterns, additional cultural factors in man - land relationships).
AD-658 550 MF$0.65

THE OM SCALE: A COMPARATIVE SOCIO-PSYCHOLOGICAL MEASURE OF INDIVIDUAL MODERNITY,
Harvard Univ Cambridge Mass
For primary bibliographic entry see Field 5J.
AD-658 806 Not available from CFSTI.

THE PROCESS OF CROSS-CULTURAL INNOVATION,
George Washington Univ Alexandria Va Human Resources Research Office
Arthur H. Niehoff, and J. Charnel Anderson. Aug 67, 21p Rept no. Professional Paper-36-67
Contract DA-44-188-ARO-2

Descriptors: (*Culture, *Sociology), Social psychology, Attitudes, Motivation, Foreign policy, Leadership, Religion, Economics, Recreation.
Identifiers: Innovation (Technology).

The paper explores cross-cultural innovation by analyzing data based on actual field studies. The primary criterion for case selection was that the characteristics of the innovator and the recipient groups be described. The country where the innovation was attempted is listed, along with the specific type of innovation proposed and the specific description of the change effort. The cases are then evaluated in terms of success and failure, and the most important factors, positive or negative, influencing the outcome are analyzed. The emerging pattern of the total process is discussed. (Author)
AD-659 038 HC$3.00 MF$0.65

THE JAPANESE AND DESCENDANTS IN BRAZIL. AN ANNOTATED BIBLIOGRAPHY,
Texas Univ., Austin.
Robert J. Smith, John B. Cornell, Hiroshi Saito, and Takashi Maeyama. 1967, 197p
Grant NSF-GS-671
Prepared in cooperation with Cornell Univ., Ithaca, N. Y. and Escola de Sociologia e Politica de Sao Paulo. Hard copy available from Centro de Estudos Nipo-Brasileiros, Sao Paulo (Brasil).

Descriptors: (*Brazil, Sociology), Population, Language, Periodicals, Bibliographies, Foreign policy, Political science, Culture.
Identifiers: Japanese people, Immigration.

The bibliography of the Japanese and their descendants in Brazil includes a considerable amount of material on the themes of emigration and immigration. At least three points of view are to be found in the literature on the Japanese in Brazil. The first is that of the government of Japan and Japanese organizations promoting emigration, whose concerns are with the financing of the emigrants, the rationalization for emigration programs, and the political context of efforts to find countries willing to accept elements of the Japanese population. The second is the point of view of the governments of Brazil and the state of Sao Paulo, as well as private organizations and individuals opposing or supporting Japanese immigration. Here the issues are complex, generally involving debates over the economic, social and racial suitability of immigrants of Japanese origin, in addition to the larger political issues. The third point of view, richly represented in the Japanese-language materials, is that of the immigrant himself. (Author)
PB-175 814 HC$3.00 MF$0.65

FEASIBILITY OF DEVELOPING COMMERCIAL RECREATION AND TOURISM FACILITIES, SANTA CLARA RESERVATION, NEW MEXICO.
Kirschner Associates, Inc., Albuquerque, N. Mex.
For primary bibliographic entry see Field 5C.
PB-176 063 HC$3.00 MF$0.65

6. BIOLOGICAL AND MEDICAL SCIENCES

6A. Biochemistry

REACTION OF MYOGLOBIN WITH 3,3-TETRAMETHYLENEGLUTARIC ANHYDRIDE,
State Univ of New York Buffalo
M. Z. Atassi. 11 Jul 66, 4p
Contract Nonr-4564 (00), Grant PHS-AM-08804-02
Availability: Published in Biochem. J. v102 p488-91 1967.

Descriptors: (*Hemoglobin, Chemical reactions), (*Amino acids, Chemical reactions), Proteins, Glutaric acids, Anhydrides, Hydrolysis, Absorption spectrum, Electrophoresis, Molecular structure, Immunology.
Identifiers: Lysines, Myoglobins, Tetramethylene glutaric anhydrides.

The extent of reaction of the protein with 3,3-tetramethyleneglutaric anhydride was measured by determining the loss of lysine and the equivalent appearance of 3,3-tetramethylene glutarimidolysine in the hydrolysate at various time-intervals. Of the 19 lysine residues in sperm-whale myoglobin, three did not react with 3,3-tetramethyleneglutaric anhydride. Also, the N-terminal valine did not react. Slight spectral changes were observed on modification of myoglobin. Electrophoretic changes were great since the derivative was negative throughout the range pH6-8.8. The derivative did not react with antisera to native sperm-whale myoglobin. (Author)
AD-658 417 Not available from CFSTI.

COLORIMETRIC PERSONAL DOSIMETER FOR HYDRAZINE FUELS.
Final rept. Jun 65-Aug 66,
Mine Safety Appliances Co Pittsburgh Pa
Charles A. Plantz. May 67, 19p
AMRL-TR-66-162
Contract AF 33 (615)-2929

Descriptors: (*Hydrazine, Colorimetric analysis), Dimethyl hydrazine (1-1), Methyl hydrazines, Dosimeters, Colors, Standards, Exposure, Toxicity, Rocket propellants, Safety.

A research program was initiated to develop a personal colorimetric dosimeter for hydrazine fuels. An extensive literature survey was conducted to ascertain the most appropriate colorimetric reactions applicable to such a device. Many reagents were found which formed a color upon contact with various hydrazine vapors; however, most of these colored reaction products proved unstable during accelerated aging tests. Bindone, (delta 1,2' -- Biindan)--1', 3,3' -- Trione, uniformly dispersed on Eastman Chromagram Sheet (Type K301R2) was selected for incorporation as the sensing element in the dosimeter badge, because its response to hydrazine, unsymmetrical dimethylhydrazine (UDMH), and monomethylhydrazine (MMH) was both linear and readily observable. Synthetic color standards were developed and included in the dosimeter to provide the user with a means of estimating accumulated exposure within the range of 100-1800 ppm-minutes. (Author)
AD-658 442 HC$3.00 MF$0.65

PREFERENCE-AVERSION FUNCTION FOR SODIUM MONOAMINODICARBOXYLATES IN RATS,
Kumamoto Univ (Japan) Medical School
For primary bibliographic entry see Field 6P.
AD-658 620 Not available from CFSTI.

PERIODATE OXIDATION OF SPERM-WHALE MYOGLOBIN AND THE ROLE OF THE METHIONINE RESIDUES IN THE ANTIGEN-ANTIBODY REACTION,
State Univ of New York Buffalo
M. Z. Atassi. 12 May 66, 10p
Contract Nonr-4564 (00), Grant PHS-AM-08804-02
Availability: Published in Biochem. J. v102 p478-87 1967.

Descriptors: (*Hemoglobin, Oxidation), (*Methionine, *Antigen-antibody reactions), Cetacea, pH, Amino acids, Tyrosine, Tryptophan, Chromatographic analysis, Immune serums, Electrophoresis, Reaction kinetics.
Identifiers: Periodates.

Oxidation of sperm-whale metmyoglobin and its apoprotein with periodate has been investigated

under various conditions of pH and temperature to find those under which the reagent acted with specificity. At pH6.8 and 22C consumption of periodate ceased in 3 1/2 hr. at 43 moles of periodate/mole of myoglobin. The two methionine residues, the two tryptophan residues, the three tyrosine residues and two histidine residues were oxidized; serine increased in the hydrolysates from 6 to 9 residues/mol. At pH5.0 and 22C, consumption levelled off in 4 1/2 hr. at 26 moles of periodate/mole of myoglobin and resulted in the modification of the two methionine residues, the two tryptophan residues, the three tyrosine residues and two histidine residues; serine increased from 6 to 7 residues/mol. and, also, ferrihaem suffered considerable oxidation. Oxidation at pH5.0 and 0C resulted at completion (4hr.) in the consumption of 22 moles of periodate/mole of myoglobin and in the modification of the methionine, tyrosine and tryptophan residues. Spectral studies indicated oxidation of the haem group. This derivative reacted very poorly with rabbit antisera to MbX. Oxidation of apomyoglobin at pH5.0 and 0C was complete in 4hr. with the consumption of 7.23 moles of periodate/mole of apoprotein. The rate of oxidation in decreasing order was: methionine; tryptophan; tyrosine; and after 7hr. of reaction the following residues/mol. were oxidized: methionine, 2.0; tryptophan, 1.6; tyrosine, 0.99. No peptide bonds were cleaved. (Author)
AD-658 644 Not available from CFSTI.

ENDOGENEOUS MECHANISM OF VASCULAR RESPONSE IN INFLAMMATION, WITH SPECIAL REFERENCE TO BIOLOGIC SIGNIFICANCE OF SPECIFIC PERMEABILITY FACTORS AND THEIR INHIBITORS NEWLY ISOLATED FROM INFLAMED SITES.
Kumamoto Univ (Japan) Medical School
For primary bibliographic entry see Field 6P.
AD-658 689 HC$3.00 MF$0.65

MOLECULAR NEUROCHEMISTRY OF RAT BRAIN DURING WATER MAZE PERFORMANCE.
York Univ Toronto (Ontario) Molecular Psychobiology Lab
For primary bibliographic entry see Field 5J.
AD-658 723 HC$3.00 MF$0.65

ELECTRON SPIN RESONANCE STUDY OF HYDROGEN-ADDITION AND -REPLACEMENT REACTIONS IN SOME PYRIMIDINE COMPOUNDS,
Duke Univ Durham N C Dept of Physics
For primary bibliographic entry see Field 7C.
AD-658 797 Not available from CFSTI.

THE INFLUENCE OF MECHANICAL EFFECTS ON ACTOMYOSIN (MECHANICAL EFFECT ON ACTOMYOSIN),
Figs. refs. omitted,
Naval Medical School Bethesda Md Translation Service
M. A. Khenokh, and V. N. Aleksandrova. 8 Aug 67, 10p Rept no. NMS-Trans-2043
TT-67-62947
Vliyanie Mekhanicheskikh Vozdeistvii na Aktomiozin, trans. of Akademiya Nauk SSSR. Institut Tsitologii. Sbornik Rabot, n12 p27-32 1966.

Descriptors: (*Proteins, Mechanical properties), (*Antibiotics, Mechanical properties), Ultrasonic properties, Freezing, Molecular structure, Chemical properties, Viscosity, Molecular association, Chemical precipitation, USSR.
Identifiers: Actinomycins.

It is shown that slight exposures to an ultra sound field produces in actomyosin solutions a number of essential changes, to wit: irreversible drop of ATP-phasic activity; decrease in SH-group content, diminution of characteristical viscosity and of molecular weight. The effect of deep freezing (-196C) results in precipitation of portion of protein. At the same time, in the remaining liquid phase, the ATP-phasic activity and the SH-group content are practically unchanged. The characteristical viscosity increases under the effect of freezing, whereas the molecular weight drops. The ultra sound effect causes changes in the primary and, probably, also in the secondary structure of actomyosin. On the other hand, the effect of cold, apparently, does not affect the primary structure of protein and, in contrast to the effect of the ultra sound, produces increased general asymmetry of the macromolecules. (Author)
AD-658 854 HC$3.00 MF$0.65

THE EFFECT OF SULFHYDRYL REAGENTS ON THE BINDING OF HUMAN HEMOGLOBIN TO HAPTOGLOBIN.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Howard F. Bunn. 12 Jun 67, 24p Rept no. US-AMRL-735

Descriptors: (*Blood chemistry, Molecular association), (*Hemoglobin, Molecular association), (*Organic sulfur compounds, Hemoglobin), Complex compounds, Acetamides, Mercury compounds, Benzoates, Amino acids, Imides, Ethers.
Identifiers: Haptoglobins.

Human hemoglobin was treated with the following sulfhydryl reagents: iodoacetamine, p-mercuribenzoate, cystine, cystamine, N-ethylmaleimide and bis (N-maleimidomethyl) ether (BME). Only BME hemoglobin showed impaired binding to serum haptoglobin. An excess of free BME hemoglobin was required to saturate the haptoglobin of normal serum. Competition studies indicated that BME hemoglobin bound haptoglobin about one-fourth as readily as normal hemoglobin. This finding was independent of haptoglobin phenotype. BME hemoglobin could be readily displaced from haptoglobin by an excess of 'normal' hemoglobin. Impaired binding to haptoglobin is yet another property which BME hemoglobin shares with deoxyhemoglobin. Possible mechanisms for this phenomenon are discussed. (Author)
AD-658 968 HC$3.00 MF$0.65

A REACTION VESSEL FOR USE IN GAS CHROMATOGRAPHIC ANALYSIS OF AQUEOUS SOLUTIONS. APPLICATION FOR BLOOD CARBON MONOXIDE DETERMINATION.
Naval Medical Research Inst Bethesda Md
For primary bibliographic entry see Field 6L.
AD-659 061 HC$3.00 MF$0.65

CONTENT OF AMINO-ACIDS IN THE DIFFERENT AREAS OF THE BRAIN UNDER CONDITIONS OF HYPEROXIA.
Defence Research Board, Ottawa (Ontario).
For primary bibliographic entry see Field 6P.
For abstract, see STAR 05 21.
N67-35903 HC$3.00 MF$0.65

6C. Biology

LEUKOCYTE COUNTS OF GERM-FREE NEONATALLY THYMECTOMIZED CFW MICE,
Notre Dame Univ Ind Lobund Lab
Patricia M. Bealmear, and Raphael Wilson. 7 Mar 67, 8p
Contract Nonr-1623 (15)
Availability: Published in Blood v30 n1 p112-9 Jul 1967.

Descriptors: (*Thymus, Excision), (*Blood counts, *Germ-free animals), Leukocytes, Hematology, Hematocrit.

Examination of hematologic data from germ-free, germ-free thymectomized, conventional, and conventional thymectomized CFW mice revealed few statistically significant differences in hematocrit values or total leukocyte counts. Germ-free thymectomized and conventional thymectomized mice had significantly higher counts than their controls on 8 and 9 days out of the first 2 weeks following thymectomy, but not after 2 weeks. A slight decrease in agranulocytes was noted in both groups of thymectomized mice only during the first 2 weeks postthymectomy. With the onset of wasting disease both granulocyte and agranulocyte counts increased in the conventional thymectomized mice. (Author)
AD-658 526 Not available from CFSTI.

NEMATODE PARASITES OF FISHES TAKEN ON TAIWAN (FORMOSA) AND ITS OFFSHORE ISLANDS,
Naval Medical Research Unit No 2 Taipei (Taiwan)
Betty June Myers, and Robert E. Kuntz. 18 Oct 66, 9p Rept no. NAMRU-2-TR-290
Availability: Published in Canadian Journal of Zoology v45 p237-41 1967.

Descriptors: (*Fishes, Parasitic diseases), (*Nematodes, *Parasites), Taiwan, Aquatic animals, Larvae.

A large number of vertebrates was examined in broad epidemiological and epizootological program to determine (1) natural parasite infections occurring in the vertebrates of Taiwan and (2) whether lower vertebrates in Taiwan carried infections which were potential parasites of man. The report lists nematodes from a number of fishes (mostly marine) some of which were infected with anisakis- and contracaecum-type larvae. The former is of potential biomedical importance. (Author)
AD-658 617 Not available from CFSTI.

ELECTROPHYSIOLOGICAL STUDY OF THE MECHANISMS SUBSERVING COLOR CODING IN THE FISH RETINA,
Keio Univ Tokyo (Japan) Dept of Physiology
Tsuneo Tomita. 1965, 8p
Grants DA-CRD-AG-S92-544-64-G26, PHS-NB-03870
Availability: Published in Cold Spring Harbor Symposia on Quantitative Biology v30 p559-66 1965.

Descriptors: (*Color vision, Electrophysiology), (*Fishes, Color vision), Retina, Responses, Photosensitivity (Biological), Photoreceptors, Spectra (Visible + ultraviolet), Adaptation (Physiology).

The S potential is the response found in layers intervening between the ganglion cell layer and the receptor cell layer. The spectral response curves of S potentials in the fish are known to reproduce qualitatively all the types of fundamental response curves predicted from Hering's opponent colors theory (Svaetichin, 1956; MacNichol and Svaetichin, 1958). It is probable that the Young-type initial response is transformed into a Hering-type response somewhere distal to the S potential level. Since the recent advance of research in this field was reviewed by MacNichol (1964), some observations are presented that complement those in his review.
AD-658 618 Not available from CFSTI.

POSTGLACIAL-GLACIAL CHANGE IN CLIMATE IN THE INDIAN OCEAN,
Lamont Geological Observatory Palisades N Y
For primary bibliographic entry see Field 8G.
AD-658 698 Not available from CFSTI.

MARINE ZOOPLANKTON IN THE WATERS OF SOUTH SAKHALIN AND THE SOUTHERN KURILE ISLANDS,
Naval Oceanographic Office Washington D C

For primary bibliographic entry see Field 8A.
AD-658 730 HC$3.00 MF$0.65

RESISTANCE TO INJURY IN INSECT CELLS DURING DIAPAUSE,
Naval Medical School Bethesda Md Translation Service
N. B. Ilinskaya. 18 Aug 67, 23p Rept no. NMS-Trans-1201
TT-67-62944
Ustoichivost Kletok Diapauziruyushchikh Nasekomykh k Povrezhdayushchim Vozdeistviyam, trans. of Akademiya Nauk SSSR. Institut Tsitologii. Sbornik Rabot, n12 p59-72 1966.

Descriptors: (*Insects, Cells (Biology)), (*Cells (Biology), Wounds + injuries), (*Diapause, Resistance (Biological)), Tissues (Biology), Life cycle, Muscles, Ethanols, Mercury compounds, Chlorides, Biological stains, Nitrophenols, Cyanides, Heat, USSR.

A report is given of studies on the resistance of muscle tissue of active insects and those in diapause, to a number of new influences, for the purpose of establishing how general and non specific the reaction of increased resistance of the tissue is during the diapause. The effect of the following agents on the tissues were studied: ethyl alcohol, mercuric chloride, malachite green, alpha-dinitrophenol, potassium cyanide, methyl blue, and high temperature.
AD-658 852 HC$3.00 MF$0.65

FORESTS AND FAUNA OF THE DEMOCRATIC REPUBLIC OF VIETNAM,
Naval Medical School Bethesda Md Translation Service
M. T. Lavrov. 26 Jul 67, 10p Rept no. NMS-Trans-2042
TT-67-62945
Trans. of mono Lesa i Zhivotnyi mir Demokraticheskoi Respubliki V'etnam, 1966 p28-35.

Descriptors: (*Mammals, *Vietnam), Insectivora, Primates, Rodents, Rabbits, Morphology (Biology), Ecology, Distribution, Behavior, USSR.

Mammals native to North Vietnam are listed and discussed by order. Brief information is given concerning the gross morphology, habits, and distribution of the more common species.
AD-658 853 HC$3.00 MF$0.65

PROGRAMMED CONTROL OF PURPOSIVE MOVEMENT.
Final rept. Jun 65-Sep 67,
Tulane Univ Covington La Delta Regional Primate Research Center
Lawrence R. Pinneo. Sep 67, 11p
Contract Nonr-475 (11)

Descriptors: (*Primates, *Motor reactions), Stimulation, Brain, Monkeys, Electrodes, Behavior, Nervous system, Control, Autonomic nervous system, Telemeter systems.

The purpose of the research was to determine the sites of the brain which upon stimulation produce purposive movement, and the necessary parameters of stimulation and programming required to elicit any form of integrated skeletal motor activity. The objectives and general approach employed were as follows: (1) squirrel and rhesus monkeys were observed and photographed with motion picture film in 'natural' behavior in cages or living compounds. This film was analyzed with a frame-by-frame projection analyzer to determine the relative sequence of various elementary limb movements in any given behavior. (2) Acute experiments were carried out on monkeys using single electrodes to extensively map the brain in order to find those loci that upon electrical stimulation produce the elementary movements observed in the compound. (3) Electrodes were chronically implanted in the sites so identified and later tested in the awake animal. (4) Attempts were made to program the elementary movements in the awake nimal in such a way as to 'produce purposive behavior.' (Author)
AD-658 888 HC$3.00 MF$0.65

BIBLIOGRAPHY OF LIESEGANG RINGS (2d. Ed.).
National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
For primary bibliographic entry see Field 7D.
NBS-Misc Pub-292 HC$0.40 MF$0.65

A REVIEW OF SOME EXPERIMENTS ON THE SYNTHESIS OF " JEEWANU".
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
L. D. Caren, and C. Ponnamperuma. Sep 67, 8p
NASA-TM-X-1439
Contract 189-55-01-18-00-21

Descriptors: *Life, *Synthesis, Critical, Exobiology, Experiment, Globule, Inorganic, Matter, Organic, Review.

For abstract, see STAR 05 21.
N67-35613 HC$3.00 MF$0.65

USE OF ULTRASONICS TO INVESTIGATE SOFT TISSUE THICKNESSES ON THE HUMAN CHEST.
Atomic Energy Establishment, Winfrith (England). Radiological and Safety Div.
C. O. Peabody, D. Ramsden, and R. G. Speight.
Mar 67, 18p AEEW-R-493

Descriptors: *Body measurement (biol), *Human body, *Tissue, *Ultrasonics, Body, Chest, Human, Measurement, Soft, Thickness.

For abstract, see STAR 05 21.
N67-35845 HC$3.00 MF$0.65

TERMITES OF AUSTRALIAN FOREST TREES.
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Entomology.
For primary bibliographic entry see Field 2F.
PB-175 900 HC$3.00 MF$0.65

TIMBER LOSSES CAUSED BY TERMITES, DECAY, AND FIRE IN TWO COASTAL FORESTS IN NEW SOUTH WALES,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Entomology.
For primary bibliographic entry see Field 2F.
PB-175 901 HC$3.00 MF$0.65

EXPERIMENTS TO DETERMINE THE POPULATIONS OF TREE-DWELLING COLONIES OF TERMITES (COPTOTERMES ACINACIFORMIS (FROGGATT) AND C. FRENCHI HILL),
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Entomology.
T. Greaves. 18 Oct 66, 15p Technical Paper-7
This report consists of pages 19-33. Order as PB-175 900.

Descriptors: (*Isoptera, *Trees), Temperature, Cooling, Growth, Periodic variations, Sensitivity, Vibration, Tables, Australia.

Techniques are described for extracting termite colonies from living trees. In 1958 the maximum number of termites obtained from a colony of Coptotermes acinaciformis (Froggatt) was 774,600. It was found that jarring the tree, associated with felling, caused a temporary migration of workers and soldiers from the nursery area. Vibrations of trees, induced by sledge hammer blows on a steel wedge, resulted in a drop in nursery temperature due to termites moving out; 1000 blows caused a drop of 11 degC. Standardized at 500 blows the departure from and return to the nursery was studied at different seasons; the drop in nursery temperature was less in summer than in winter due to the presence of fewer termites. A temporary rise in temperature below the nursery indicated that termites moved down the tree. Fewer termites were obtained in 1959, due to warmer weather, but artificial cooling with dry ice forced the termites to return to the nursery to maintain the high temperature. In one colony 1,250,000 termites were obtained after cooling. Cooling with dry ice was more rapid in trees infested with C. frenchi Hill owing to the presence of large concentric galleries around the nurseries. 615,300 termites were obtained from a relatively small colony of C. frenchi. The relation of nursery size, shape, and age to populations of colonies is discussed. It is estimated that extremely large colonies in old-growth trees could contain from four to eight million termites. (Author)
PB-175 902 HC$3.00 MF$0.65

THE CONTROL OF TERMITES (COPTOTERMES SPP.) IN BLACKBUTT (EUCALYPTUS PILULARIS),
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Entomology.
T. Greaves, R. S. McInnes, and J. E. Dowse. 18 Oct 66, 9p Technical Paper-7
This report consists of pages 35-43. Order as PB-175 900.

Descriptors: (*Isoptera, Control), Insecticides, Colloids, Effectiveness, Temperature, Arsenic compounds, Oxides, Mortality rates, Trees, Entomology, Australia.

Low cost treatments with arsenic trioxide and emulsions or dusts containing aldrin, dieldrin, or telodrin completely destroyed colonies of Coptotermes acinaciformis (Froggatt) and C. frenchi Hill when applied into the nursery area. Dusts were also completely effective when blown into galleries from aeration holes. At the lowest concentration tested (0.25%), telodrin dust was completely effective when blown into the nursery area. Temperature changes were studied in colonies treated with 0.5 oz white arsenic or 2 oz of 2.0% dieldrin dust. There was a rapid drop in nursery temperature during the first day after treatment, due to the death of the colony. Later, in the arsenic-treated colonies the nursery temperature rose to over 40 degrees C, due, presumably, to fermentation of the dead termites massed in the nursery. This massing was not so marked in the dieldrin treatments, due to the different mode of action of this insecticide. (Author)
PB-175 903 HC$3.00 MF$0.65

6D. Bionics

RESEARCH ON INFORMATION PROCESSING IN THE CENTRAL NERVOUS SYSTEM.
Final rept. 1 Feb 62-31 Jan 66,
Massachusetts General Hospital Boston Stanley Cobb Labs for Psychiatric Research
Frank R. Ervin. Aug 67, 108p
AFCRL-67-0145
Contract AF 19 (628)-408
See also AD-621 277.

Descriptors: (*Central nervous system, *Bionics), Computer programs, Pattern recognition, Visual perception, Cerebral cortex, Electrophysiology, Stimulation, Nerve cells, Nerve impulses, Cats, Information theory.

An on-line computer controlled visual stimulation and computation of the post stimulus time histogram of single neurons in cat visual cortex was

carried out. Three-hundred fifty cells are described as to temporal firing pattern and field response curves. In addition, the effects of background illumination and reticular formation stimulation were studied in a smaller number. These two variables were effective in modifying field response patterns primarily by modifying basal firing levels and excitability. The use of single spot stimulation suggests the existence of a receptive field which would show unique sensitivity to (simple) geometric form or motion without the convergent coding at the geniculate suggested in the literature. In addition, these fields prove to be capable of modulation by changing circumstance. This view of the structure of the visual cortex of the mammal necessitates some revision of simplistic models which have been advanced for hardware realization of pattern-recognizing artifacts. (Author)
AD-658 494 HC$3.00 MF$0.65

RESEARCH ON SELF-ORGANIZING MACHINES.
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 9B.
AD-658 527 HC$3.00 MF$0.65

SOVIET CYBERNETICS: RECENT NEWS ITEMS NO. 8,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 9B.
AD-658 818 HC$3.00 MF$0.65

CYBERNETICS AND SPEECH COMMUNICATIONS: A SURVEY OF RUSSIAN LITERATURE.
Air Force Avionics Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 17B.
AD-658 943 Not available from CFSTI.

6E. Clinical Medicine

CORONARY ARTERY OCCLUSION IN THE INTACT UNANESTHETIZED DOG: INTERCORONARY REFLEXES,
Walter Reed Army Inst of Research Washington D C
Eugene E. Joyce, and Donald E. Gregg. 25 Jan 67, 8p
Availability: Published in American Journal of Physiology v213 n1 p64-70 Jul 1967.

Descriptors: (*Cardiovascular diseases, Obstruction (Physiology)), Heart, Arteries, Reflexes, Blood circulation, Surgery, Dogs.

A 20- to 30-sec occlusion of the descendens coronary artery in conscious dogs well-recovered from surgery decreased mildly cardiac output, stroke volume, and myocardial contractility. There was a delayed increase in phasic circumflex coronary flow and a decrease in mean coronary resistance and end-diastolic coronary resistance. Various drugs did not alter this over-all response pattern. Evidence of a vasoconstrictor reflex could not be demonstrated in these experiments. (Author)
AD-658 604 Not available from CFSTI.

AN IMPROVED TURBIDIMETRIC ANALYSIS OF POLYETHYLENE GLYCOL UTILIZING AN EMULSIFIER,
Walter Reed Army Inst of Research Washington D C
Sidney J. Malawer, and Don W. Powell. 14 Apr 67, 8p
Availability: Published in Gastroenterology v53 n2 p250-6 1967.

Descriptors: (*Glycols, Optical analysis), (*Gastrointestinal system, Tracer studies), Colloids, Stabilization, Concentration (Chemistry), Absorption spectrum, Polymers.
Identifiers: Polyethylene glycols, Turbitimetric analysis.

The turbidimetric analysis of polyethylene glycol (PEG) was modified by adding a water-soluble vegetable gum (gum arabic or gum ghatti) to the reaction mixture. The use of such an emulsifying agent in the PEG oil-in-water emulsion results in the following: A stable, prolonged peak of maximum turbidity which makes precise timing during the determination unnecessary; a linear PEG concentration-optical density relationship over a useful range of PEG concentrations; and an accurate and reproducible method of analysis. (Author)
AD-658 607 Not available from CFSTI.

MILITARY PSYCHIATRY: A PROTOTYPE OF SOCIAL AND PREVENTIVE PSYCHIATRY IN THE UNITED STATES,
Walter Reed Army Inst of Research Washington D C
William Hausman, and David McK. Rioch. 28 Dec 66, 13p
Availability: Published in Archives of General Psychiatry v16 p727-39 Jun 1967.

Descriptors: (*Military medicine, *Psychiatry), History, Social psychology, Neuroses, Casualties, Medical personnel, Training, Military psychology.

An attempt is made to summarize the history of the development of the concepts of preventive and social psychiatry insofar as they have been pioneered since the first World War in military psychiatry. The cardinal principles of military psychiatry, immediacy, proximity, and expectancy, were established as the basis for new techniques for the management of cases of combat neurosis by Salmon in World War I, and were rediscovered and reimplemented prior to the end of World War II by Army psychiatrists. Glass' contributions in the latter campaign, in Korea, and in establishing, documenting, and disseminating the principles and techniques of community psychiatry since those combat periods, also have been described. The principles of immediacy, proximity, and expectancy have been further elaborated and extended into their nonmilitary applications, and Bushard's descriptions of the terms concurrence and commitment, originally defined in relationship to the military environment only, have been broadened in context in order to demonstrate their application to the larger discipline of social and preventive psychiatry.
AD-658 609 Not available from CFSTI.

IMMUNITY AGAINST EXPERIMENTAL CHOLERA (32121),
SEATO Medical Research Lab Bangkok (Thailand) Dept of Bacteriology and Mycology
Richard A. Finkelstein, and Pongsom Atthasampunna. 14 Nov 66, 5p
Availability: Published in Proceedings of the Society for Experimental Biology and Medicine v125 p465-9 1967.

Descriptors: (*Cholera, Immunity), Vaccines, Resistance (Biological), Rabbits, Effectiveness.
Identifiers: Choleragen.

Choleragen, administered parenterally, immunized adult rabbits against intestinal challenge with either living cholera vibrios or with choleragen. A degree of resistance against choleragen could be passively transferred by serum to infant rabbits. These results suggest that choleragen offers promise as an effective immunogen against cholera although additional study is needed before any field studies can be performed. (Author)
AD-658 616 Not available from CFSTI.

EFFECT OF EXPOSURE TO TANK NOISE UPON HEARING ACUITY OF TANK CREWS,
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch, and Robert H. Walpole. 20 Jan 43, 6p
Rept. on proj. 'Estimation of the Practical Significance of Tank Noise'.

Descriptors: (*Auditory acuity, Army personnel), (*Tanks (Combat vehicles), Noise), Hearing, Audiometry, Deafness, Military medicine.

Since the noise in tanks may reach relatively high levels it appeared desirable to determine whether or not the hearing of tank crews suffered impairment as a result of fairly long periods of operation. An opportunity to investigate the problem was presented in connection with extensive road and field tests of a group of M-4 A-3 medium tanks. Twenty-three (23) members of tank crews were tested throughout the audible band at intervals over a period of forty-one (41) days. Readings were taken approximately twelve (12) hours after exposure to avoid any effects of temporary fatigue deafness. Data from each man were plotted chronologically in order to demonstrate whether or not changes in hearing acuity occurred with time. In addition, three men were studied for a period of several hours immediately following exposure for the purpose of observing fatigue deafness. No measureable hearing loss at any frequency was observed among the subjects during the test period. In general, no fatigue deafness was found in the three subjects who were tested immediately following a period of 5 hours exposure to tank noise. On the basis of these tests, the likelihood of permanent damage to hearing from exposure to the noise in M-4 A-3 medium tanks appears to be remote if indeed existent.
AD-658 629 HC$3.00 MF$0.65

OBSERVER, POA AND SWPA, 9 APRIL - 13 JULY 1945,
Army Medical Research Lab Fort Knox Ky
William B. Bean. 17 Nov 45, 11p

Descriptors: (*Military medicine, Tropical regions), (*Military rations, Nutrition), Pacific Ocean islands, Military personnel, Warfare, Climatology, Ecology, Ingestion (Physiology), Parasitic diseases, Water, Sodium chloride, Morale, Hospitals, Gunnery, Performance (Human), Physical fitness.

A report is presented on the Nutritional status of World War II troops in certain Pacific Islands. Relevant problems also considered include: Climatology, tropical deterioration, diseases, malaria, water and salt, rations, morale, hospitals, and armor.
AD-658 633 HC$3.00 MF$0.65

AIR POLLUTION ASTHMA IN OSAKA, JAPAN.
Final rept. 15 Dec 65-14 Jun 67,
Yodogawa Christian Hospital Osaka (Japan)
Ovid B. Bush, Jr. Jun 67, 63p
ARDG (FE)-J-222-4
Contract DA-92-557-FEC-37767

Descriptors: (*Allergy, *Air pollution), Respiratory diseases, Medical examination, Public health, Statistical analysis, Plants (Botany), Periodic variations, Tables, Particles, Sulfur compounds, Dioxides, Japan.

Two problems were studied: (1) was the syndrome of 'Tokyo-Yokohama Asthma' a separate and distinct syndrome or was it a group of three clinical entities (true asthma, acute bronchitis, chronic obstructive pulmonary disease); (2) could the syndrome of 'Tokyo-Yokohama Asthma' be found in Osaka as well as in the Tokyo-Yokohama area. 146 patients were studied and complete records were kept on 124. A standardized questionnaire, physical examination, laboratory tests, and spirometric studies, as well as the use of air conditioners and electrostatic precipitators for clean air rooms were used to evaluate these problems. SO2 and particulate levels were measured. Cases of each of the three clinical entities mentioned above were found. The patients responded to the clean

air environment, but upon return to their homes some have again had respiratory difficulties. The syndrome of 'Tokyo-Yokohama Asthma,' therefore, is in reality three distinct clinical entities and not a single syndrome. The clinical entities described above do occur in the Osaka area and it is suspected that they would occur in any area where there is a high level of air pollution and during seasons when there is a large number of respiratory illnesses. It is believed that there is a connection between air pollution and the severity and complications of respiratory illnesses. (Author)
AD-658 687 HC$3.00 MF$0.65

ENDOGENEOUS MECHANISM OF VASCULAR RESPONSE IN INFLAMMATION, WITH SPECIAL REFERENCE TO BIOLOGIC SIGNIFICANCE OF SPECIFIC PERMEABILITY FACTORS AND THEIR INHIBITORS NEWLY ISOLATED FROM INFLAMED SITES.
Kumamoto Univ (Japan) Medical School
For primary bibliographic entry see Field 6P.
AD-658 689 HC$3.00 MF$0.65

LUNG CHANGES RESULTING FROM PROLONGED EXPOSURE TO 100% OXYGEN AT 550 mm Hg.
Phase rept.,
Naval Air Development Center Johnsville Pa Aerospace Medical Research Dept
George H. Kydd. 17 May 67, 31p Rept no. NADC-MR-6710

Descriptors: (*Oxygen, Toxicity), (*Lungs, Pathology), Pressure breathing, Respiration, Histology, Blood vessels, Germ-free animals, Stress (Physiology), Rats.

Rats exposed to 100% oxygen at 500 mm Hg for 30 days survive and show no respiratory or other difficulty during the exposure. Histological examination of the lung tissue indicates that the blood vessels of the lung have undergone a change in structure during the exposure. The results suggest that the media is eroded as evidenced by thin vessel walls and by streaming of the media into the adventitia. There is also evidence of hypertrophy and/or hyperplasia in the vessel walls. (Author)
AD-658 720 HC$3.00 MF$0.65

FEASIBILITY OF INTRA-SERVICE STANDARDIZATION OF AUDIOMETRIC TESTS AND TESTING PROCEDURES. CURRENT STATUS AND RECOMMENDATIONS FOR STANDARDIZATION,
National Academy of Sciences-National Research Council Washington D C Comm on Hearing Bioacoustics Biomechanics
A. Glorig, J. Zwislocki, H. W. Ades, J. P. Albrite, and A. Cohen. Sep 67, 20p
Contract Nonr-2300 (05)
Report of Working Group 43.

Descriptors: (*Audiometry, Standardization), Feasibility studies, Test methods, Hearing, Armed Forces (United States), Tests.

Currently, audiometric tests and procedures, equipment and its calibration, and policies with respect to audiological personnel show a considerable variation not only among but also within the Armed Services. Standardization appears both feasible and urgent. Specific recommendations are made. It is believed that standardization along the recommended guide lines would substantially increase the reliability and efficiency of auditory testing in the Armed Services. (Author)
AD-658 725 HC$3.00 MF$0.65

COUPLERS FOR CALIBRATION OF EARPHONES,
National Academy of Sciences-National Research Council Washington D C Comm on Hearing Bioacoustics Biomechanics
J. J. Zwislocki, R. W. Benson, R. L. Grason, A. F. Niemoeller, and W. F. Rudmose. Sep 67, 13p
Contract Nonr-2300 (05)
Report of Working Group 48, Review of Existing Situation and Recommendations for Needed Research and Development Work.

Descriptors: (*Earphones, Calibration), (*Audiometry, Earphones), Hearing, Coupling circuits, Specifications, Auditory perception, Tests, Acoustic equipment, Deafness.

Present methods of coupler calibration of earphones are unsatisfactory and there is a need for basic as well as applied research before a more satisfactory coupler can be developed. General guidelines and specifications for the needed research and development are suggested. (Author)
AD-658 726 HC$3.00 MF$0.65

RESEARCH ACTIVITIES OF THE COMMISSION ON EPIDEMIOLOGICAL SURVEY, AFEB,
Army Medical Unit Frederick Md
For primary bibliographic entry see Field 15B.
AD-658 800 Not available from CFSTI.

DISTRIBUTION OF WUCHERERIOSIS, BRUGHIOSIS AND CLONOROCHOSIS IN THE DEMOCRATIC REPUBLIC OF VIETNAM (REVIEW OF LITERATURE),
Naval Medical School Bethesda Md Translation Service
A. I. Khrimlian. 22 Aug 64, 6p Rept no. NMS-Trans-2046
TT-67-62946
Rasprostranenie Vukhererioza Brugioza i Klonorkhoza v Demokraticheskoi Respublike V'etnam, trans. of Meditsinskaya Parazitologiya i Parazitarnye Bolezni (USSR) v34 p153-6 1965.

Descriptors: (*Parasitic diseases, *Vietnam), Reviews, Filariae, Trematodes, Distribution, Infections, USSR.
Identifiers: Brugiosis, Clonorochosis, Wuchereriosis.

The incidence and distributions of the fillarial infections, wuchereriosis and brughiosis, and the liver fluke infection, clonorochosis, in North Vietnam are tabulated and discussed.
AD-658 855 HC$3.00 MF$0.65

SURFACE TEMPERATURE AS A PARAMETER IN ESTIMATING LASER INJURY THRESHOLDS.
Interim rept.,
Army Medical Research Lab Fort Knox Ky
George R. Peacock. 8 Jun 67, 32p Rept no. USAMRL-733

Descriptors: (*Lasers, *Wounds + injuries), (*Burns, Predictions), (*Eye, Wounds + injuries), Tissues (Biology), Retina, Infrared radiation, Thermal radiation, Surface temperatures.

A simple model based on elevation of the surface temperature in biological tissue was formulated in an attempt to aid in estimating laser injury thresholds. The model shows reasonable agreement in the ranges where experimental data are available. This fact lends confidence to predictions of injury thresholds for other laser wavelengths and pulse length. Predictions are made in particular for eye injury in the visible and near infrared, for tissue burns in the mid- and far-infrared. (Author)
AD-658 967 HC$3.00 MF$0.65

EFFECT OF THE ROUTE OF ADMINISTRATION ON THE NEUTRALIZING POTENCY OF ANTIVENINS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6T.
AD-658 974 HC$3.00 MF$0.65

TEMPERATURE MEASUREMENTS IN EXPERIMENTAL TUMORS FOLLOWING EXPOSURE TO RUBY LASER ENERGY.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Alan J. McCartney, Wilma F. Hall, and Joseph C. Rosenbaum, Jr. 4 Aug 67, 12p Rept no. USAMRL-746

Descriptors: (*Lasers, *Therapy), (*Neoplasms, Lasers), (*Tissues (Biology), Temperature), Thermocouples, Implants, Coherent radiation, Heating, Measurement.

An approach to accurate measurement of time temperatures with an implanted thermocouple following ruby laser exposure is described. The problems inherent in such measurements are discussed. This method indicates a linear reciprocal correlation between temperature and depth from 0.25C/joule at 2 mm depth to 0.11C/joule at 5 mm depth. (Author)
AD-658 975 HC$3.00 MF$0.65

ELECTRONIC ADJUSTABLE PREHENSION HAND.
Walter Reed Army Medical Center Washington D C Army Medical Biomechanical Research Lab
For primary bibliographic entry see Field 6L.
AD-658 982 HC$3.00 MF$0.65

PATHOPHYSIOLOGICAL STUDIES OF TEN POISONOUS SNAKE VENOMS.
Edgewood Arsenal Md
For primary bibliographic entry see Field 6T.
AD-658 986 HC$3.00 MF$0.65

HOMOGRAFT RESPONSE IN ADULT-THYMECTOMIZED MICE: DEFICIENCY WITH AGING AND AFTER LOW DOSE-RATE GAMMA-IRRADIATION,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 6R.
AD-659 026 HC$3.00 MF$0.65

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES RESEARCH GRANTS, PART I. BY GRANT NUMBER BY INVESTIGATOR.
National Inst. of General Medical Sciences, Bethesda, Md. Program Analysis Branch.
For primary bibliographic entry see Field 5I.
PB-175 986 HC$3.00 MF$0.65

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES RESEARCH GRANTS, PART II. BY STUDY SECTION.
National Inst. of General Medical Sciences, Bethesda, Md. Program Analysis Branch.
For primary bibliographic entry see Field 5I.
PB-175 987 HC$3.00 MF$0.65

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES RESEARCH GRANTS, PART III. BY INSTITUTION.
National Inst. of General Medical Sciences, Bethesda, Md. Program Analysis Branch.
For primary bibliographic entry see Field 5I.
PB-175 988 HC$3.00 MF$0.65

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES TRAINING GRANTS.
National Inst. of General Medical Sciences, Bethesda, Md. Program Analysis Branch.
For primary bibliographic entry see Field 5I.
PB-175 989 HC$3.00 MF$0.65

THE QUANTITATIVE NATURE OF THE RELATIONSHIP OF CORONARY ARTERY ATHER-

OSCLEROSIS AND CORONARY HEART DISEASE RISK,
California Univ., Livermore. Lawrence Radiation Lab.
John W. Gofman. May 67, 19p
Contract W-7405-eng-48

Descriptors: (*Atherosclerosis, Population), (*Cardiovascular diseases, *Mortality rates), Probability, Pathology, Heart.

For abstract, see NSA 21 19.
UCRL-50270 HC$3.00 MF$0.65

6F. Environmental Biology

CBE FACTORS: MONTHLY SURVEY NO. 17.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-658 438 HC$3.00 MF$0.65

LIFE IN EXTRATERRESTRIAL ENVIRONMENTS QUARTERLY STATUS REPORT, 31 MAY - 31 AUG. 1967.
IIT Research Inst., Annapolis, Md.
Aug 67, 11p NASA-CR-88134, IITRI-L6023-10
Contract NASR-22/14-003-001/

Descriptors: *Bacillus, *Extraterrestrial life, *Mars environment, *Space simulation, Carbon dioxide, Ecology, Environment, Extraterrestrial, Life, Mars, Mars (planet), Microorganism, Simulation, Soil, Space.

For abstract, see STAR 05 21.
N67-36580 HC$3.00 MF$0.65

6H. Food

TREATMENT OF MESS KITS TO REMOVE GLARE,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 627 HC$3.00 MF$0.65

NUMERICAL REQUIREMENTS FOR STATISTICALLY VALID RESULTS IN FIELD TEST OF ACCEPTABILITY OF RATIONS,
Army Medical Research Lab Fort Knox Ky
Charles R. Henderson, William B. Bean, and William F. Ashe. 24 Mar 45, 8p Rept no. 1

Descriptors: (*Military rations, Acceptability), Statistical analysis, Accuracy, Tests, Population, Sampling.

In short tests (2-3 weeks) little accuracy is sacrificed by collecting opinion data only every third or fourth day. In longer tests (2 months) no significant accuracy is lost if data are obtained only once a week. Data from the first few days may show more variations than those obtained later on in a 3-week test. Where there are only relatively few items to test, a period long enough for each menu or item to appear only 3 or 4 times will apparently give results little different from those obtained when the test components are used several times as often. If acceptability of rations for weeks or months is desired, it is necessary to test the rations for the entire period but data need be collected no more frequently than 6 or 7 days. From the statistical point of view, groups of at least 2 platoons (60-80 men) are needed to give reliable information on the relative acceptability of items in a single ration. For reasons of organization, supply, command, morale and losses from normal attrition, groups of company size (100-150 men) are more desirable. (Author)
AD-658 631 HC$3.00 MF$0.65

NUTRITION SURVEY IN PACIFIC THEATRE OF OPERATIONS,
Army Medical Research Lab Fort Knox Ky
William B. Bean, Charles R. Henderson, Robert E. Johnson, and Lyle M. Richardson. 22 Aug 45, 108p Rept no. 6

Descriptors: (*Military rations, Nutrition), Warfare, Pacific Ocean islands, Diseases, Diet, Food, Deficiency diseases, Physical fitness, Hematology, Blood chemistry, Vitamins, Medical examination, Military medicine, Military personnel.

Ration issues were studied by interviews with QM personnel and examination of warehousing and subsistence. Information on overall food consumption was obtained by examination of messes. Observations included: (1) Thoroughgoing interviews on dietary history overseas in order to estimate food consumption. (2) Medical history to detect symptoms attributable to nutritional disturbances, and diseases which might interfere with nutrition. (3) Medical examination to establish the absence or presence of clinical signs of specific nutritional deficiencies. (4) A test to estimate physical fitness. (5) Biochemical measurements of whole blood hemoglobin, plasma protein, urinary vitamin C, vitamin B1, vitamin B2, chloride and acetone bodies in order to assess nutritional status with respect to water, salt, hematopoietic factors, protein and vitamins C, B1 and B2.
AD-658 632 HC$3.00 MF$0.65

DESERT RATION STUDY. K-2 RATION. DESERT TRAINING AREA.
Rept. no. 1, 20-26 Sep 42,
Army Medical Research Lab Fort Knox Ky
William B. Bean. 20 Oct 42, 15p

Descriptors: (*Military rations, Acceptability), Food, Deserts, Packaging, Containers, Diet, Vitamins, Sodium chloride, Water, Stability, Nutrition, Questionnaires.

Special rations adapted for combat operations need certain modifications for desert warfare. These result from the environment with its high temperatures, scarcity of wood for fuel, enhanced requirements for water and salt for personnel and miscellaneous conditions peculiar to different desert regions. The present test was carried out on the K-2 Desert Ration. It differs from the K-1 Ration only in having the fruit juice in individual cans, packed with the ration in a single package for each meal for each soldier. Points for consideration were the acceptability, stability, packaging, satisfying qualities, and undesirable effects. Observations were made by selected medical officers on the use of the rations, their acceptance, and the general reaction to the ration during a 5-day field exercise.
AD-658 645 HC$3.00 MF$0.65

TEST OF THE ADEQUACY OF K-2 RATION IN THE DESERT,
Army Medical Research Lab Fort Knox Ky
William B. Bean. 22 Oct 42, 5p
Rept. on proj. 'Test of the K-2 Ration.'

Descriptors: (*Military rations, Acceptability), Deserts, Packaging, Food, Diet, Containers, Vitamins, Sodium chloride, Water, Stability, Nutrition, Questionnaires.

Special rations adapted for combat operations need certain modifications for desert warfare. These result from the environment with its high temperatures, scarcity of wood for fuel, enhanced requirements for water and salt for personnel and miscellaneous conditions peculiar to different desert regions. The present test was carried out on the K-2 Desert Ration. It differs from the K-1 Ration only in having the fruit juice in individual cans, packed with the ration in a single package for each meal for each soldier. Observations were made by selected medical officers on the use of rations, their acceptance, and the general reaction to the ration during a 5-day field exercise.
AD-658 646 HC$3.00 MF$0.65

FIELD TEST OF ACCEPTABILITY AND ADEQUACY OF U. S. ARMY C, K, 10-IN-1 AND CANADIAN ARMY MESS TIN RATIONS.
Final rept.,
Army Medical Research Lab Fort Knox Ky
William B. Bean. 22 Nov 44, 227p

Descriptors: (*Military rations, Acceptability), Questionnaires, Diet, Food, Physical fitness, Army personnel, Nutrition, Tests, Vitamins, Morale, Medical examination.

The improvements in C Ration embodied in the Experimental and New types have rendered it highly acceptable: the components of the Old C Ration had low consumption and poor acceptability rating. Variety, good quality and the use of common American foods all contributed to the excellence of the ration. The inherently messy side-opening of cans was the chief drawback. The present K Ration, when the fullest variety was available, was well received and consumed. The issue of cheese was too large. Bouillon was poorly received. Lemon powder rated fair. The new meat components and new biscuits were a definite improvement over the old types. Sardines, pea soup and milk-and-sugar powder in the Canadian Army Mess Tin Ration were not well received, but acceptability of jam and butter was high. Monotony is the chief fault over a 3 week period. Low acceptability by American troops is not necessarily true for Canadian or British troops. The 10-in-1 Ration was excellent for support area feeding. The K Ration components of the noon meal rated low on acceptability. Dehydrated products were not generally acceptable unless their preparation received special attention. The rotation of 5 menus provided ample variation where menus differ significantly, through qualitative ratings showed decreasing acceptability of certain items as monotony became a factor. The philosophy of having an emergency type ration lunch in a support area ration is not consistent, and its use in theaters of operations should be studied. If mobility is essential, each meal should be packed individually so that all the components would not have to be assembled and sorted when movement takes place. (Author)
AD-658 648 HC$3.00 MF$0.65

6J. Industrial (Occupational) Medicine

SURFACE TEMPERATURE AS A PARAMETER IN ESTIMATING LASER INJURY THRESHOLDS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6E.
AD-658 967 HC$3.00 MF$0.65

6K. Life Support

GOLD-CHLORINE AND GOLD-BROMINE EQUILIBRIA IN MOLTEN ALKALI HALIDES.
Naval Ship Research and Development Center Annapolis Md Annapolis Div
For primary bibliographic entry see Field 7D.
AD-659 032 HC$3.00 MF$0.65

AUXILIARY POWER SYSTEMS FOR A LUNAR ROVING VEHICLE.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 10A.
For abstract, see STAR 05 21.
N67-35793 HC$3.00 MF$0.65

CHEMOSYNTHETIC GAS EXCHANGER FINAL REPORT, 8 JUN. 1964 - 14 MAR. 1967.
Martin Co., Baltimore, Md. RIAS Div.
L. Bongers, and J. C. Medici. Apr 67, 66p
NASA-CR-88357, ER-13634-11
Contract NASW-971

Descriptors: *Bacteria, *Bioregeneration, *Space exploration, Biosynthesis, Chemical, Coupling, Electrolysis, Exploration, Function, Hydrogen, Man, Metabolism, Nutrition, Oxygen, Space, Synthesis, Waste, Water.

For abstract, see STAR 05 21.
N67-36592 HC$3.00 MF$0.65

6L. Medical and Hospital Equipment

SURVIVAL OF ACD BLOOD AFTER SERIAL STORAGE.
Interim rept.,
Army Medical Research Lab Fort Knox Ky
Charles E. Shields. 30 Jun 67, 14p Rept no. USAMRL-741

Descriptors: (*Blood, Storage), Preservation, Containers, Additives, Citrates, Glucose, Blood transfusions.

Study of post-transfusion survival in 218 normal recipients indicated that liquid whole blood collected in acid-citrate-dextrose (ACD) solution in plastic containers had survival values over 70% through 28 days of storage. Studies done 20 years ago had values over 70% through 21 days of storage, but were carried out using glass containers and this may be the major factor involved in the change though experience and sophistication by blood bank personnel may also have a role. However, even though realizing that these studies under ideal conditions could be considerably altered under full field conditions involving such variables as time, transport and storage, based on these laboratory comparisons and with the plastic unit now standard equipment, an extension of shelf life from 21 days to 28 days would appear feasible, particularly in military overseas operations. (Author)
AD-658 970 HC$3.00 MF$0.65

ELECTRONIC ADJUSTABLE PREHENSION HAND.
Technical rept.,
Walter Reed Army Medical Center Washington D C Army Medical Biomechanical Research Lab
Roy I. Katsuren, and Lloyd L. Salisbury, Jr. Aug 67, 11p Rept no. TR-6706

Descriptors: (*Artificial limbs, Power equipment), (*Hands, Prosthetics), Design, Force (Mechanics), Control systems, Weight.

The design of an electrically powered No. 3 hand is described. A prototype hand was built containing an electronic circuit with a potentiometer for manually varying the prehension force from one to ten pounds. Closing speed was approximately two seconds. The weight of the hand was about 1.24 pounds. This weight was considered excessive and an effort at reducing the weight resulted in only a 15% reduction. The hand will be redesigned with a fourteen ounce weight limitation. (Author)
AD-658 982 HC$3.00 MF$0.65

PLASTIC DROP-FOOT BRACES.
Technical rept.,
Walter Reed Army Medical Center Washington D C Army Medical Biomechanical Research Lab
James T. Hill, Henry G. Mouhot, and Allard L. Fenwick. Aug 67, 17p Rept no. TR-6709

Descriptors: (*Supports, *Medical equipment), (*Feet, Supports), Plastics, Reinforced plastics, Epoxy plastics, Glass textiles, Rods.

A technique for preparing epoxy-fiberglass drop-foot braces is described. The resulting braces are 30% lighter than their metal counterparts without sacrifice of strength. The conventional ankle joint has been eliminated and replaced with reinforced plastics rods that provide the necessary ankle motion and foot lift. Specially designed adaptors allow interchangeability of shoes in addition to their function of controlling the amount of foot lift. (Author)
AD-658 983 HC$3.00 MF$0.65

A REACTION VESSEL FOR USE IN GAS CHROMATOGRAPHIC ANALYSIS OF AQUEOUS SOLUTIONS. APPLICATION FOR BLOOD CARBON MONOXIDE DETERMINATION.
Research rept.,
Naval Medical Research Inst Bethesda Md
F. Lee Rodkey, and Harold A. Collison. Mar 67, 14p
NAVMED-MR005.04.0002-16

Descriptors: (*Gas chromatography, Instrumentation), (*Blood, Gas chromatography), Carbon monoxide, Chromatographic analysis, Gas analysis, Design, Operation.

A reaction vessel was designed and constructed for use in gas chromatographic analysis of gases liberated from aqueous solutions. The apparatus is a self contained attachment which replaces the standard gas sampling loop on the chromatograph. A single interchangeable glass tube with a ground glass joint is used and is convenient to prepare, clean and replace between analyses. Gas sweep-out characteristics of the vessel were tested with carbon monoxide liberated from a carboxyhemoglobin solution. A sweep-out period with the carrier gas of 1 to 3 minutes was shown to recover 99.4 to 99.7 per cent of the total CO originally present in the solution. The usefulness of the reaction vessel was demonstrated by the measurement of blood carbon monoxide content in a series of 74 hospital patients. (Author)
AD-659 061 HC$3.00 MF$0.65

6M. Microbiology

CBE FACTORS: MONTHLY SURVEY NO. 17.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-658 438 HC$3.00 MF$0.65

A SAFETY TEST FOR EASTERN EQUINE ENCEPHALOMYELITIS VACCINE,
Walter Reed Army Inst of Research Washington D C
Sanford Berman, Joseph P. Lowenthal, James V. Sorrentino, and Arthur B. White. 7 Apr 67, 2p
Availability: Published in Applied Microbiology v15 n4 p968-9 Jul 1967.

Descriptors: (*Eastern equine encephalomyelitis virus, *Vaccines), Safety, Tests, Preparation, Tissue culture, Chickens.

The results indicate that, of the safety test systems evaluated, the 6- to 12-hr-old chick is the most sensitive for detecting residual live EEE virus in EEE vaccine. In addition, the use of the chick instead of the mouse permits a 17-fold increase in the volume of vaccine tested per animal, with results available in 7 instead of 21 days. (Author)
AD-658 606 Not available from CFSTI.

BIBLIOGRAPHY ON TISSUE CULTURES: INVERTEBRATES AND COLD-BLOODED CHORDATES,
Fort Detrick Frederick Md
Mary Shipp Watson, and James H. Gilford. Aug 67, 27p Rept no. Miscellaneous Pub-10-Suppl-1

Descriptors: (*Tissue culture, Bibliographies), Invertebrates, Mammals, Parasites, Arthropods, Mollusca, Echinodermata, Amphibians, Reptiles, Indexes.

The volume contains a bibliographic listing of 151 literature references concerning tissue culture studies of invertebrates and cold-blooded chordates. A complete author index is included. (Author)
AD-658 678 HC$3.00 MF$0.65

EPIDEMIOLOGICAL AND GENETICAL STUDIES ON THE DRUG-RESISTANCE OF STAPHYLOCOCCI.
Final rept. 21 Jun 66-20 Jun 67,
Gunma Univ Maebashi (Japan) Dept of Microbiology
Susumu Mitsuhashi. Sep 67, 18p
ARDG (FE)-J-183-6
Contract DA-92-557-FEC-38283

Descriptors: (*Staphylococcus, Resistance (Biological)), Bacteriophages, Drugs, Genetics, Antibiotics, Epidemiology, Biophysics, Japan.

Surveys of staphylococcal strains, isolated from clinical sources in geographically scattered hospitals in Japan, disclosed the following facts: (1) Triple (TC.SM.SA, TC.PC.SA, PC.SM.SA) and quadruple (TC.PC.SM.SA) resistant strains with reference to TC, SM, PC and SA, were manifest and they were restricted to specific phage group. (2) There are two types of resistant strains: the first becomes resistant easily and consequently multiple resistant when a new drug is introduced, and consists largely of strains in phage group I containing phage type 80/81. The second type remains single (SA) or double (PC.SA, SM.SA) resistant, and consists primarily of strains in group II and III. From the facts that all of the tested staphylococcal strains from clinical sources carry prophages and their drug resistance can be transduced to other strains by their prophages, the present author presents the hypothesis that transduction of drug resistance by prophage is mainly responsible for the acquisition of multiple resistance and wide distribution of multiple resistant strains. Genetic studies of drug resistance in staphylococci have disclosed the following facts: (1) Resistance to TC is easily transduced at high frequencies by prophages obtained from multiple resistant strains. Resistance to SA and SM is jointly transduced with TC. Resistance to PC, the ability to form penicillinase (PCase), is not transduced jointly with resistance to TC, SM and SA. (Author)
AD-658 686 HC$3.00 MF$0.65

EXAMINATION FOR COMPLEMENT-REQUIRING NEUTRALIZING ANTIBODIES AGAINST JAPANESE ENCEPHALITIS, WESTERN EQUINE ENCEPHALITIS AND VACCINIA VIRUSES.
Final rept. 25 Jun 66-24 Jun 67,
Yokohama Municipal Univ (Japan) Faculty of Medicine
Kamesaburo Yoshino. Sep 67, 21p
ARDG (FE)-J-288-2
Contract DA-92-557-FEC-39983

Descriptors: (*Viruses, Immune serums), (*Antigens + antibodies, *Immune serums), Complement, Serodiagnosis, Japanese B encephalitis virus, Western equine encephalomyelitis virus, Vaccinia virus, Guinea pigs, Immunity, Japan.

It was planned to examine whether the early serum of animals immunized with Western equine encephalitis (WEE), Japanese encephalitis (JE) and vaccinia viruses contained complement-requiring neutralizing (CRN) antibody. A prerequisite to

this experiment was to establish a simple neutralization test procedure which could titrate antibody titers of many serum samples at one time. Umeda et al's agar cover slip technique used for herpes virus neutralization was applied to WEE and JE viruses. When reaction mixtures were placed at 4C overnight and then at 37C for 3 hours before inoculation to cells, a clear endpoint could be obtained. With vaccinia virus, this method is not yet applicable. By the use of the above method, sera of guinea pigs immunized with WEE virus were subjected to neutralization tests in the presence and absence of 10 units complement, and it was shown that the CRN antibody appeared in the 2nd week serum. An exact estimation of the first detectable time of this antibody is being studied now. It seems that the appearance of the CRN antibody precedes that of HI and CF antibodies. In the cases of JE and vaccinia viruses, preliminary tests using rabbits clearly showed that the CRN antibodies appeared in early serums, and detailed tests are being done at present to determine the exact time of its appearance and the immunochemical nature of the CRN antibodies thereby obtained. (Author)
AD-658 688 HC$3.00 MF$0.65

UNIQUE METHODS OF VIRAL COLLECTION AND IDENTIFICATION.
Final rept. 1 Jan 66-30 Jun 67,
Midwest Research Inst Kansas City Mo
L. H. Goodson, J. O. MacFarlane, and D. A. Ringle. 30 Jun 67, 124p Rept no. MRI-FR-2927-B
Contract AF 41 (609)-3020

Descriptors: (*Viruses, Identification), Collecting methods, Blood cells, Antigens + antibodies, Fluorescent antibody techniques, Phospholipids, Electrophoresis, Phagocytes, In vitro analysis, Immunity, Poliomyelitis virus, Reticulo-endothelial system.

Six unique methods for the rapid identification of virus have been devised and investigated to determine their potential suitability for use in the fabrication of a new virus identification system. In the phagocytosis in vitro studies we prepared immune WBC and observed their response when challenged with virus. Impedance measurements on phospholipid bilayer membranes in buffer solutions have been used to detect the immune reaction. The effects of virus challenge on the electrophoretic migration rate of antibody coated plastic particles and tanned sheep red blood cells have been measured. Hydrogen overvoltage measurements have been performed on solutions containing antibody and antigen-antibody complexes. Fluorescent tagged antibody has been employed in the single and double immunodiffusion techniques in an effort to visualize the 'soluble' virus-antibody conjugates. Virus has been tagged with rhodamine to permit its use with immobilized antibody for a viral identification process. Molecular sieves and ion exchange resins have been employed in studies for the separation and detection of 'soluble' virus-antibody complexes.
AD-658 860 HC$3.00 MF$0.65

CYTOCHEMICAL STUDIES OF PLANETARY MICROORGANISMS - EXPLORATIONS IN EXOBIOLOGY STATUS REPORT, 1 OCT. 1966 - 1 APR. 1967.
Stanford Univ., Calif. Instrumentation Research Lab.
J. Lederberg, and E. C. Levinthall. 1 Apr 67, 98p
NASA-CR-88326, IRL-1056
Grant NSG-81-60

Descriptors: *Chemistry, *Computer programming, *Microorganism, Atmosphere, Computer, Cytology, Exobiology, Gas chromatography, Instrumentation, Mass spectrometer, Planetary, Programming.

For abstract, see STAR 05 21.
N67-36527 HC$3.00 MF$0.65

LIFE IN EXTRATERRESTRIAL ENVIRONMENTS QUARTERLY STATUS REPORT, 31 MAY - 31 AUG. 1967.
IIT Research Inst., Annapolis, Md.
For primary bibliographic entry see Field 6F.
For abstract, see STAR 05 21.
N67-36580 HC$3.00 MF$0.65

6N. Personnel Selection and Maintenance (Medical)

PRESELECTION TESTS.
Rept. no. 2,
Army Medical Research Lab Fort Knox Ky
W. F. Ashe. 22 Apr 44, 42p

Descriptors: (*Army personnel, Selection), Classification, Recruiting, Physical fitness, Dentistry, Medical examination, Army training.

The purpose of the research was to critically analyze some of the physical characteristics of the personnel of the 16th Armored Division and to demonstrate the value of such additional information in classification.
AD-658 622 HC$3.00 MF$0.65

PRESELECTION TESTS, PARTIAL REPORT NUMBER I,
Army Medical Research Lab Fort Knox Ky
William F. Ashe. 20 Jan 43, 12p

Descriptors: (*Army personnel, Selection), Medical examination, Military requirements, Physical fitness, Army training.

Selection of Army personnel is that which is achieved by examination procedures at the reception centers. Better initial selection will reduce wastage. In addition, suitable preselection of men in relation to the requirements of their tasks will materially shorten the training period and yield a more efficient unit. To do this, criteria of selection were established and the mechanics of the test procedure were set up.
AD-658 623 HC$3.00 MF$0.65

STUDY OF SCHEDULES, DURATION AND DISCIPLINE OF REST PERIODS FOR TANK CREWS ON LONG MARCHES,
Army Medical Research Lab Fort Knox Ky
William F. Ashe, Max Ress, and Fred H. Glenny.
9 May 44, 7p
Rept. on proj. 'Crew Fatigue Research.'

Descriptors: (*Army personnel, Fatigue (Physiology)), Physical fitness, Army training, Feet, Casualties.

Repeated daily marching over distances which are practical and feasible for the movement of the supplies of an army do not cause serious fatigue in men properly trained, fed and rested. A group of 12 men marched 480 miles in five weeks and completed the last 125 miles in five days without evidence of undue fatigue. The causes of casualties or failure to complete an assigned march, are foot defects and not general fatigue. Healthy, normal young men (ages 18 to 35) with normal feet, good footgear and proper foot care can be trained to perform long marches daily without casualties. Men with anatomical foot defects cannot perform long marches daily without casualties.
AD-658 625 HC$3.00 MF$0.65

EXTREMAL FACTORS OF LONG-TERM SPACE FLIGHT AND HEALTH REQUIREMENTS FOR SPACECRAFT CREWS.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 6S.
For abstract, see STAR 05 21.
N67-36480 HC$3.00 MF$0.65

6O. Pharmacology

CBE FACTORS: MONTHLY SURVEY NO. 17.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-658 438 HC$3.00 MF$0.65

EFFECT OF VARYING PERIODS OF COLD EXPOSURE ON THE ACTION AND METABOLISM OF HEXOBARBITAL,
Pittsburgh Univ Pa School of Medicine
Sarah C. Kalser, and Rosemarie Kunig. 1967, 20p

AFOSR-67-2106
Grants AF-AFOSR-87-66, PHS-AM-07702

Descriptors: (*Barbiturates, Metabolism), (*Exposure, Barbiturates), In vitro analysis, Pharmacology, Heat production (Biology), Shivering, Rats.
Identifiers: Cold tolerance.

The hypnotic effects of hexobarbital were compared with its rate of in Vitro metabolism in the rat exposed to cold for varying periods of time. With cold exposure of 2 to 3 days, increase of hypnotic potency is not parallel to an alteration of drug metabolism by liver 9000 x g supernatant. For the latter to become reduced, cold exposure has to be extended to 2 to 3 weeks. The most striking finding of this work was the dissociation of hyponotic potency from in vitro drug metabolism during short periods of cold exposure which contrasts with the results from long periods of exposure. (Author)
AD-658 478 HC$3.00 MF$0.65

TROPINE-LABELED ATROPINE METABOLISM IN MAN N-C14H3-ATROPINE,
Pittsburgh Univ Pa School of Medicine
S. C. Kalser, and P. L. McLain. 1967, 7p
AFOSR-67-2120
Grant AF-AFOSR-87-66

Descriptors: (*Atropine, Metabolism), Labeled substances, Tolerances (Physiology), Excretion, Tracer studies, Electrocardiography, Blood chemistry, Urine, Chromatographic analysis.

The excretion of the C14 in the urine and expired air, and the disappearance of the C14 from the blood after an intramuscular injection of 2 mg. are discussed in this report. Chromatographic analysis of urinary components is incomplete, but preliminary data suggests that most of the label is present in the urine as unchanged atropine and as its hydrolysis product, tropine. A total of 88% of the injected dose was collected in the urine in 48 hours. A unique finding was the occurrence of C14 in the expired air, indicative of a demethylation being one of the metabolic pathways for atropine in man. Approximately 3% of the injected dose was recovered in the expired air in the 3 hours during which samples were taken. Blood levels were extremely low, indicative of avid tissue binding of the drug, but did seem to reach a maximum at 30 minutes after injection, a time at which maximum tachycardia was also observed. Expired air C14O2 showed a maximum at 75 minutes, while the peak urinary concentration occured at 3 hours. (Author)
AD-658 547 HC$3.00 MF$0.65

EPIDEMIOLOGICAL AND GENETICAL STUDIES ON THE DRUG-RESISTANCE OF STAPHYLOCOCCI.
Gunma Univ Maebashi (Japan) Dept of Microbiology
For primary bibliographic entry see Field 6M.
AD-658 686 HC$3.00 MF$0.65

THE INFLUENCE OF MECHANICAL EFFECTS ON ACTOMYOSIN (MECHANICAL EFFECT ON ACTOMYOSIN).
Naval Medical School Bethesda Md Translation Service
For primary bibliographic entry see Field 6A.
AD-658 854 HC$3.00 MF$0.65

ESTER AND STIMULUS FREQUENCY MEDIATED PERTURBATIONS OF RESPONSE PATTERNS FROM CAT SOLEUS TISSUES,
Naval Medical Research Inst Bethesda Md
S. L. Friess, R. C. Durant, H. L. Martin, and W. V. Hudak. 13 Feb 67, 12p
NAVMED-MR005.06-0006-44
Availability: Published in Toxicology and Applied Pharmacology v10 n2 p352-61 Mar 1967.

Descriptors: (*Chemoreceptors, Stimulation), (*Neuromuscular transmission, Stimulation), (*Esters, Neuromuscular transmission), N-heterocyclic compounds, Toluenes, Acetates, Iodides, Skeletal muscle relaxants, Muscles, Contraction, Nerves, Cats.
Identifiers: Soleus muscle, Tropine tolylacetates.

Contractile response patterns evoked by the tertiary aminoester tropine p-tolylacetate and its quaternary methiodid, on steady-state infusion into the in situ cat soleus neuromuscular preparation, were studied as a function of ester concentration and frequency of electrical stimuli to nerve. With spaced bursts of stimuli to nerve producing isometric response bursts from muscle, intraarterial administration of either ester results in a biphasic action pattern; at low ester concentrations small degrees (5-10%) of response amplification are met, with a progressive transition to response blockade at higher ester levels. For the quaternary methiodide ester, the effects of individual variation in concentration of agent and mean frequency of stimulus mode employed appear to be inversely related in production of response amplification from soleus muscle, with pairing of high concentration-low frequency of conversely low concentration-high frequency parameters leading, respectively, to optimum amplification. These results are discussed in terms of possible mechanisms governing chemical effects mediated at the soleus neuromuscular junction. (Author)
AD-658 939 Not available from CFSTI.

EFFECTS OF THIOPENTAL SEDATION ON LEARNING AND MEMORY.
Stanford Univ Calif Dept of Psychology
For primary bibliographic entry see Field 5J.
AD-659 018 Not available from CFSTI.

FIVE-DAY REPEATED INTRAVENOUS ADMINISTRATION - RHESUS MONKEYS,
Hazelton Labs., Inc., Falls Church, Va.
Howard Feinman, T. W. Tusing, Elton R. Homan, and David P. Rall. 12 Sep 67, 16p Rept. no. 220
Contract PH-43-63-1168

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Hydrolases, Parenteral infusions, Monkeys, Dosage, Toxic tolerances, Body weight, Body temperature, Appetite, Behavior, Hematology, Blood chemistry, Pathology, Histology.
Identifiers: Asparaginase.

L-asparaginase at a level of 1000 IU/kg/day was administered intravenously to one male and one female young rhesus monkey for five consecutive days. The total daily dose was given in two single injections each day at 12-hour intervals. The criteria of effect evaluated were appearance and behavior, appetite, weight gain, body temperature, hematologic and biochemical studies, and gross and microscopic pathology. L-asparaginase was well tolerated by the two young monkeys during the five-day dose regime and during the 30-day observation period following the last dose. Both monkeys remained essentially normal as to appetite, elimination, general appearance and behavior, and gained or maintained body weight throughout the study. Rectal temperatures revealed fluctuations which were within the range of normal variation. There were no local inflammatory responses to the sensitivity tests. Both animals exhibited transient local irritation at the IV injection sites on the fifth day. Values for most hematologic and biochemical parameters were within normal limits. A slight reticulocyte response was recorded for the male monkey following the five-day dose regime and there was a slight increase in values for the serum transaminase and alkaline phosphatase on the fifth day of the dose regime in both monkeys. Gross and microscopic pathologic evaluation of tissues revealed no distinctive alterations in the major viscera except for increased pigment deposition in the Kupffer cells of the liver. (Author)
PB-175 956 HC$3.00 MF$0.65

6P. Physiology

VISUAL ACUITY DURING VIBRATION AS A FUNCTION OF FREQUENCY, AMPLITUDE AND SUBJECT DISPLAY RELATIONSHIP.
Final rept. Jul 65-Jun 66,
Cornell Aeronautical Lab Inc Buffalo N Y
L. Rubenstein, and H. A. Taub. Jun 67, 25p
AMRL-TR-66-181
Contract AF 33 (657)-11729

Descriptors: (*Visual acuity, *Vibration), Performance (Human), Acceleration, Eye, Anxiety, Motion.

Visual acuity during whole body Z-axis vibration (while in a semi-supine position) was measured as a function of frequency and amplitude of the input vibration, two restraint configurations (with or without a bite-bar), and two subject-display relationships (subject alone vibrating, and subject and display both vibrating). The results indicated an interaction between frequency of vibration and the restraint variable in their effects on visual acuity. Visual acuity suffered greater decrement with the bite-bar than without it, and the degree of this difference increased with increasing frequency. The effects of these variables were quite similar for both subject-display relationships. The report also describes the development of the method which was used to measure visual acuity. This is a vernier technique which makes use of a varying contrast ratio between the visual target and the background. (Author)
AD-658 440 HC$3.00 MF$0.65

TWO-HANDED RETENTION ON VARIOUS HANDLE CONFIGURATIONS.
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 5E.
AD-658 441 HC$3.00 MF$0.65

EFFECT OF VARYING PERIODS OF COLD EXPOSURE ON THE ACTION AND METABOLISM OF HEXOBARBITAL,
Pittsburgh Univ Pa School of Medicine
For primary bibliographic entry see Field 6O.
AD-658 478 HC$3.00 MF$0.65

ELECTRICAL COUPLING AND NORMAL MODES OF OSCILLATION IN DENSE EXCITABLE CELLULAR STRUCTURES.
Final status rept. 1 Apr-1 Jul 67,
Aerojet-General Corp Los Angeles Calif Space-General Center for Research and Education
Robert M. Stewart. Aug 67, 54p Rept no. SG-1198/SR-1
Contract N00014-67-C-0361

Descriptors: (*Nervous system, Anatomical models), Rhythm (Biology), Nerve impulses, Nerves, Electrochemistry, Regeneration, Feedback, Reverberation, Nerve cells, Oscillation, Coupling circuits, Electrical conductance.

An experimental study, largely using simple inorganic electrochemical models, of structural and electrical characteristics which lead, through the agency of electrical fields, to intercellular transmission of excitation or 'information' and to intrinsic oscillations (both sub- and suprathreshold) in dense arrays of both biological neurones and neuron-like data-processing elements as now being developed. Such periodic phenomena are presumed to have both physiological and pathological significance in (normal and abnormal) brain function, but are, as yet, only little understood. (Author)
AD-658 519 HC$3.00 MF$0.65

SURVEY OF FOOT MEASUREMENTS AND THE PROPER FIT OF ARMY SHOES; STUDY OF SWEATING OF THE FEET OF MARCHING TROOPS.
Rept. no. 2,
Army Medical Research Lab Fort Knox Ky
Arthur Freedman, and Charles M. Kirkpatrick. 4 Dec 45, 11p

Descriptors: (*Perspiration, Feet), Socks, Shoes, Army personnel, Acceptability, Excretion, Moisture.

Factual information pertaining to foot sweating was studied with regard to: (1) The rate and volume of sweat secretion; (2) The relationship of sweating to foot symptoms; (3) The water retentive characteristics of service shoes and of various types of socks.
AD-658 563 HC$3.00 MF$0.65

COMPARISON AND EVALUATION OF FIELD AND LABORATORY METHODS OF MEASURING NIGHT-SEEING ABILITY OF GROUND TROOPS,
Army Medical Research Lab Fort Knox Ky
Lester B. Roberts, and Wendell E. Mann. 1 May 44, 44p
Rept. on projs. 'Night Vision from Tanks' and 'Comparison and Evaluation of Field and Laboratory Methods of Measuring Night Vision Acuity.'

Descriptors: (*Night vision, Measurement), Vision, Night warfare, Tests, Laboratories, Army personnel, Accuracy.

The purpose of the report is to evaluate the usefulness of various laboratory tests to measure night-seeing ability of ground troops and to choose a test suitable for selection of ground troops for night operations. It is desired to choose from available test methods one which will select men with reasonable accuracy for night-seeing ability for ground night operations. One basis for selection is to test men with the available instruments and to compare these results with the ability to perform visual tasks in the field, the tasks to be of the type normally required of ground troops during night operations. Such a method was employed after preliminary tests indicated that it was possible to devise a field test which could be properly scored and which involved visual tasks of the types normally encountered by ground troops. The instruments and tests compared were AAF Night Vision Tester, Luckiesh-Moss Variable Contrast Charts, S.A.M. Tester, Luminous Plaque and the A.M.R.L. Field Test. Description of test and test equipment and results are given. (Author)
AD-658 577 HC$3.00 MF$0.65

THE ADVANTAGES OF USING BINOCULARS FOR NIGHT SEEING,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 17H.
AD-658 583 HC$3.00 MF$0.65

EFFECT OF ENDOTOXIN ON IRON ABSORPTION,
Walter Reed Army Inst of Research Washington D C
For primary bibliographic entry see Field 6T.
AD-658 605 Not available from CFSTI.

ELECTROPHYSIOLOGICAL STUDY OF THE MECHANISMS SUBSERVING COLOR CODING IN THE FISH RETINA,
Keio Univ Tokyo (Japan) Dept of Physiology
For primary bibliographic entry see Field 6C.
AD-658 618 Not available from CFSTI.

MULTIMODAL SENSITIVITY OF TASTE UNITS IN THE RAT,
Kumamoto Univ (Japan) Medical School
Satoru Yamashita, Hisashi Ogawa, and Masayasu Sato. 21 Feb 67, 5p
Grant DA-CRD-AG-S92-544-65-G30
Availability: Published in The Kumanoto Medical Journal v20 n1 p67-70 1967.

Descriptors: (*Taste, Sensitivity), Sensory mechanisms, End organs, Nerve fibers, Sodium chloride, Sucrose, Cinchona alkaloids, Temperature, Rats, Japan.
Identifiers: Chorda tympani.

A report is given of studies concerning the responsiveness of taste units of rats to thermal and gustatory stimuli. The measurements were made by recording impulses from single or a few fibers in the chorda tympani nerve upon stimulation with solutions of NaCl, sucrose, or quinine HCl; or with tap water at various temperatures.
AD-658 619 Not available from CFSTI.

PREFERENCE-AVERSION FUNCTION FOR SODIUM MONOAMINODICARBOXYLATES IN RATS,
Kumamoto Univ (Japan) Medical School
Yasutake Hiji, and Masayasu Sato. 14 Feb 67, 3p
Grant DA-CRD-AG-S92-544-65-G30
Availability: Published in J. Physiol Soc. Japan v29 p168-9 1967.

Descriptors: (*Taste, *Stereochemistry), (*Amino acids, Taste), Aspartic acid, Glutamic acid, Sodium compounds, Salts, Sodium chloride, Rats, Sensory mechanisms, Japan.
Identifiers: Sodium aspartates, Sodium glutamates.

Amino acids are known to produce different taste according to the difference in their stereochemical structure. Stereoisomers of the salts of amino acids have also been known to possess different taste. For example, monosodium L-glutamate (L-MSG) produces 'good' taste, while monosodium D-glutamate (D-MSG) possesses a very weak sweet taste. Preference for L- and D-MSG was measured in the rat. Preference measurements were also carried out on monosodium L-aspartate (L-MSA) and sodium chloride for comparison. In a separate series of experiments electrophysiological measurements were performed to determine quantitatively the magnitude of neural gustatory responses to these salts. The results suggest that D-MSG produces gustatory informations different in quality from that produced by L-MSG and L-MSA, while the latter two salts produce informations of a similar kind to each other.
AD-658 620 Not available from CFSTI.

FOOT MEASUREMENTS OF PROPER FIT OF ARMY SHOES,
Army Medical Research Lab Fort Knox Ky
Arthur Freedman, Everett C. Huntington, George C. Davis, Richard B. Magee, and Valgene M. Milstead. 11 Mar 46. 172p Rept no. 3
Rept. on proj. 'Fort Dimensions of Soldiers.'

Descriptors: (*Feet, Measurement), (*Shoes, Army personnel), Anthropometry, Design, Tables.

A plan was developed to secure as many foot measurements as seemed necessary for the definition of the variety of foot sizes and shapes, on a sufficient number of subjects to be representative of the young, male population of the Army. The slection of the appropriate measurements was made on the basis of the experience accumulated by the Laboratory, and modified in accordance with suggestions offered by the Quartermaster representatives, shoe and last manufacturers, an orthopedist, and an anthropologist. Special effort was made to select and define the dimensions to be measured in such a way that the position of each in space could be described. Accordingly, in general, all length and breadth measurements are referred to a set of rectilinear cordinates by orienting the foot prior to measuring, and, wherever necessary, measurements are referred to definable landmarks on the foot surface or at a standard distance from some constant reference point. Accordingly, the measurements are not in every instance those in current use by the shoe trade. (Author)
AD-658 682 HC$3.00 MF$0.65

ENDOGENEOUS MECHANISM OF VASCULAR RESPONSE IN INFLAMMATION, WITH SPECIAL REFERENCE TO BIOLOGIC SIGNIFICANCE OF SPECIFIC PERMEABILITY FACTORS AND THEIR INHIBITORS NEWLY ISOLATED FROM INFLAMED SITES.
Final rept. 11 Jun 66-10 Jun 67,
Kumamoto Univ (Japan) Medical School
Hideo Hayashi. Jul 67, 48p
ARDG (FE)-J-287-2
Contract DA-92-557-FEC-39807

Descriptors: (*Tissues (Biology), *Permeability), (*Burns, Physiology), (*Blood vessels, Permeability), Skin, Wounds + injuries, Peptides, Purification, Chromatographic analysis, Electrophoresis, Sedimentation, Molecular weight, Japan.

A permeability factor responsible for the delayed Arthus vascular response was previously discovered in the local skin site. The Arthus permeability factor was found to be a complex of three factors I, II and III. Successful purification by chromatography of factors II and III was performed; these substances were non-diffusible and thermostable peptides, and behaved as homogeneous substances on electrophoresis and ultracentrifugation. A similar permeability factor was also discovered in the delayed thermal vascular lesion. The permeability factor was also made up of three factors, I, II and III. The factors II and III showing a stronger permeability-increasing effect were successfully purified by chromatography. The effect of all these factors was long-active on experimental injection in contrast to short-living effect of permeability factors which were reported from other laboratories. The observations would seem to be very important for the endogeneous mechanism of increased vascular permeability in inflammation.
AD-658 689 HC$3.00 MF$0.65

THE RELATION OF DARK ADAPTATION TO DURATION OF PRIOR RED ADAPTATION,
Naval Medical Research Lab New London Conn
Richard T. Mitchell, Ailene Morris, and Forrest L. Dimmick. 6 Dec 50, 21p Rept no. 166, Vol 9/No 15
Availability: Published in Medical Research Lab. v9 n15 p258-77 1950.

Descriptors: (*Night vision, *Adaptation (Physiology)), Vision, Time, Sensitivity, Eyeglasses, Colors, Brightness.

The effects of duration of red preadaptation upon the immediate brightness threshold and upon the course of dark adaptation are presented. Measurements were made following seven adaptation periods of 0 to 40 minutes wearing red goggles under a preadapting brightness of 150 mL. It was found that red adaptation increased the rate of subsequent dark adaptation so that the 5 log micromicro L threshold was reached in one half the time after wearing red goggles for five minutes, and in one fourth the time after 20 minutes in red. Forty minutes in red gave no further decrease in dark adaptation time. In terms of the total time (red plus dark) required to dark adapt to a threshold of 5 log micromicro L, the first five minutes of red adaptation showed the greatest efficiency. Five minutes in red goggles followed by 3.8 minutes in darkness are equivalent to 8.2 minutes in darkness. Red preadaptation for long periods (20 minutes or more) produces relatively little dark adaptation compared with the same time spent in total darkness. The sensitivity reached by wearing red goggles for 40 minutes was still 2.75 log micromicro L above the 30 minute threshold in total darkness. (Author)
AD-658 746 Not available from CFSTI.

GUSTATORY AND THERMAL RESPONSES IN THE GLOSSOPHARYNGEAL NERVE OF THE RABBIT AND CAT,
Kumamoto Univ (Japan) Medical School
Kazuhiro Yamada. 26 Jun 66, 17p
Grant DA-CRD-AG-S92-544-65-G30
Availability: Published in The Japanese Journal of Physiology v17 p94-110 1967.

Descriptors: (*Taste, Sensitivity), Sensory mechanisms, Nerves, End organs, Stimulation, Sodium chloride, Sucrose, Cinchona alkaloids, Temperature, Rabbits, Cats, Japan.
Identifiers: Glossopharyngeal nerves.

The report deals with the results of experiments on gustatory and thermal responses in the glossopharyngeal nerve using the rabbit and cat, and shows that in these two animal species responsiveness to bitter, sour and sweet substances is more developed in the glossopharyngeal nerve than in the chorda tympani.
AD-658 808 Not available from CFSTI.

THE EFFECT OF SOME PROTECTIVE SUBSTANCES ON THE PROCESS OF FREEZING AND THAWING OF CELLULAR ELEMENTS IN THE BLOOD.
Figs. refs. omitted,
Naval Medical School Bethesda Md Translation Service
V. I. Teodorovich, and G. A. Kozlov. 11 Aug 67, 16p Rept no. NMS-Trans-1200
TT-67-62943
Vliyanie Zashichitnykh Veshehestv na Protsess Zamorazhiyaniya i Ottaivaniya Kletochnykh Elementov Krovi, trans. of Akademiya Nauk SSSR. Institut Tsitologii. Sbornik Rabot, n12 p51-8 1966.

Descriptors: (*Blood cells, Freezing), Storage, Heating, Protection, Additives, Ethanols, Glucose, Citrates, Glycerols, Crystallization, Preservation, Blood.

Damage to blood cells in blood taken with the usual glucose-citrate solution with out the addition of protective substances, occurs during the process of freezing and thawing, apparently, occurs essentially during the stage of thawing. Ethyl alcohol, used as a protective substance, in a complex glucose-citrate solution, protects to a certain degree, the blood cells during the process of freezing and thawing in spite of intensive re-crystallization, even at relatively low temperature. In the concentrated solution, containing two protective substances (ethyl alcohol and glycerine), the process of recrystallization is weak. At temperatures to -50C a considerable portion of the solution remains non-crystallized and fills up the canals be-

tween the crystals in which there are present some mobile cells. (Author)
AD-658 850 HC$3.00 MF$0.65

RESISTANCE TO INJURY IN INSECT CELLS DURING DIAPAUSE,
Naval Medical School Bethesda Md Translation Service
For primary bibliographic entry see Field 6C.
AD-658 852 HC$3.00 MF$0.65

STATISTICAL MECHANICS OF NEURAL NETWORKS,
Chicago Univ Ill Committee on Mathematical Biology
Jack D. Cowan. 1967, 103p
Contract F61052-67-C-0061

Descriptors: (*Nerve cells, Mathematical models), Differential equations, Brain, Interactions, Mechanics.

A mathematical model is developed of the activity of networks of model nerve-cells or neurons. A n nlinear delay operator is introduced to represent the transfer characteristics of neurons. This operator is a continuous function that represents the mean neuronal response to stimulating currents. The mathematics used is not the Boolean algebra of switching circuits, but Differential equations. The dynamics is examined of certain model brain circuits, some of which are shown to exhibit undamped responses to stimuli, but only for a few levels of activity. The techniques of Hamiltonian mechanics and of Gibbsian statistical mechanics are used to connect these models with experimental data. A preliminary explanation is given for the existence of preferred states found in the firing patterns of neurons in animal nervous systems. (Author)
AD-658 886 HC$3.00 MF$0.65

PROGRAMMED CONTROL OF PURPOSIVE MOVEMENT.
Tulane Univ Covington La Delta Regional Primate Research Center
For primary bibliographic entry see Field 6C.
AD-658 888 HC$3.00 MF$0.65

ESTER AND STIMULUS FREQUENCY MEDIATED PERTURBATIONS OF RESPONSE PATTERNS FROM CAT SOLEUS TISSUES,
Naval Medical Research Inst Bethesda Md
For primary bibliographic entry see Field 6O.
AD-658 939 Not available from CFSTI.

IMMUNOGENIC RESPONSE OF THE VENOMS OF FER-DE-LANCE (BOTHROPS ATROX ASPER) AND LACASCABELLA (CROTALUS DURISSUS DURISSUS) FOLLOWING PHOTOOXIDATIVE DETOXIFICATION.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6T.
AD-658 972 HC$3.00 MF$0.65

IMMUNIZATION STUDIES WITH NAJA NAJA VENOM DETOXIFIED BY PHOTOOXIDATION.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6T.
AD-658 973 HC$3.00 MF$0.65

THE GLOMERULAR FILTRATION OF HEMOGLOBIN: A PROPOSED MECHANISM.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Howard F. Bunn, Robert W. Bull, and James H. Jandl. 18 Aug 67, 12p Rept no. USAMRL-747

Descriptors: (*Hemoglobin, *Kidneys), Molecular association, Dissociation, Tracer studies, Permeability, Metabolism, Blood circulation.
Identifiers: Glomerular filtration.

The relative ease with which hemoglobin is filtered by the kidney suggests that the molecule may enter the glomerulus primarily as a half molecule. Glomerular filtration of hemoglobin was assayed by the accumulation of kidney radioactivity following the injection of iron-59 labeled hemoglobin to haptoglobin depleted animals. In rats the renal uptake of BME hemoglobin (a form shown to have a reduced degree of symmetrical dissociation into dimers) was only one-fourth that of labeled oxyhemoglobin. Shortly after the injection of deoxyhemoglobin into the renal arteries of rabbits, the kidney activity was about two-thirds that of animals receiving oxyhemoglobin. Renal uptake was enchanced by progressive dilution of the injected oxyhemoglobin. These results support the hypothesis that hemoglobin is filtered through the kidney primarily as an alpha-beta dimer. (Author)
AD-658 976 HC$3.00 MF$0.65

THIRST LEVEL DURING THE CONSUMPTION OF FLAVORED WATER: EFFECTS ON SUBSEQUENT PREFERENCE.
Progress rept.,
Army Medical Research Lab Fort Knox Ky
Samuel H. Revusky. 22 Aug 67, 11p Rept no. USAMRL-748

Descriptors: (*Thirst, Test methods), Water, Consumption, Taste, Behavior, Motivation, Measurement, Lasers, Wounds + injuries, Edema.

Conceivably, the edema produced by laser irradiation may produce a state of thirst, but there is no reasonable way to test for this in animals. Usually thirst is detected by an increase in the amount of water rewarded work an animal will do, but the laser irradiation also seems to interfere with effective performance so as to drown out any presumed increased motivation for water. Thus, an attempt was made to discover if thirst could be detected by some other method. Rats were allowed to drink water of one flavor while thirsty and a second flavor while satiated for water. They then were given a choice between these two flavors. During the choice test, there was an increment in the preference for the flavor of the water which was consumed while the rats were thirsty. It now is possile to evaluate whether a state of thirst is created by laser injury.
AD-658 977 HC$3.00 MF$0.65

THE SCALING OF EFFORT PRODUCED BY STRENUOUS ISOMETRIC MUSCLE CONTRACTIONS.
Progress rept.,
Army Medical Research Lab Fort Knox Ky
Lee S. Caldwell. 8 Sep 67, 12p Rept no. USAMRL-749

Descriptors: (*Strength, Test methods), (*Performance (Human), Strength), (*Muscles, Stress (Physiology)), Contraction, Blood circulation, Obstruction (Physiology), Psychophysiology, Endurance, Fatigue (Physiology).

Thirty-five Ss were required to maintain manual loads equal to 30%, 40%, 50%, 60%, 70%, and 80% of their maximum strength as long as possible and to report the intensity of the effort required by the task on a five-point scale. With each increase in load, endurance was reduced and effort developed at an increased rate, showing that effort rating was sensitive to variations in contraction strength. External occlusion of the blood supply to the contracting muscles, especially at the lighter loads, also produced briefer maximum contraction times and accelerated the reports of the various levels of effort. The contraction strength at which the internal pressure in the muscle effectively occluded the blood supply was found to be between 60% and 70% of maximum strength. The data were transformed to eliminate differences in endurance produced by the various experimental conditions by expressing the time of appearance of each level of effort as a percentage of the time at which maximum effort was reported for that condition. When this was done, it was found that effort was a linear function of the percentage maximum contraction time. (Author)
AD-658 979 HC$3.00 MF$0.65

PATHOPHYSIOLOGICAL STUDIES OF TEN POISONOUS SNAKE VENOMS.
Edgewood Arsenal Md
For primary bibliographic entry see Field 6T.
AD-658 986 HC$3.00 MF$0.65

HOMOGRAFT RESPONSE IN ADULT-THYMECTOMIZED MICE: DEFICIENCY WITH AGING AND AFTER LOW DOSE-RATE GAMMA-IRRADIATION,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 6R.
AD-659 026 HC$3.00 MF$0.65

THE IMMUNOLOGIC REACTIVITY OF LONG-LIVED LYMPHOCYTES IN SITU IN RAT POPLITEAL LYMPH NODES,
Naval Radiological Defense Lab San Francisco Calif
John J. Miller, III, and Leonard J. Cole. 4 Aug 67, 24p Rept no. USNRDL-TR-67-93

Descriptors: (*Lymphocytes, *Immunology), (*Antigen-antibody reactions, Tracer studies), Rats, Lymphatic system, Tritiated compounds, Thymidines, Autoradiography, Vaccines, Mitosis, Transplantation.

The cells of the popliteal lymph nodes of rats were labeled with tritiated thymidine for 4 days after primary or secondary injections of old tuberculin (OT), or after a secondary injection of TAB vaccine. Thirty-one days after the last dose of thymidine rats of each group were challenged with one or the other of these antigens. Increased numbers of heavily labeled large lymphocytes and mitotic figures were present in the popliteal nodes for two days after challenge with TAB vaccine whether the tritiated thymidine was given following OT or TAB vaccine. No such rreaction was found after challenge with OT. The ability of labeled long-lived lymphocytes to react in situ to TAB vaccine 7 months after labeling was also demonstrated. These results confirm the validity of the method of following labeled lymphocytes for long periods of time since they show that at least some such cells retain the ability to enlarge and divide. The hypothesis that small lymphocytes are specific 'memory cells' is not supported by the findings that long-lived small lymphocytes can react to a primary stimulus. (Author)
AD-659 027 HC$3.00 MF$0.65

RELATIONSHIPS BETWEEN SENSITIVITIES OF BLOOD-VOLUME CHANGE, PULSE-VOLUME CHANGE, AND THE GSR.
Indiana Univ Bloomington
For primary bibliographic entry see Field 5J.
AD-659 063 HC$3.00 MF$0.65

CONTENT OF AMINO-ACIDS IN THE DIFFERENT AREAS OF THE BRAIN UNDER CONDITIONS OF HYPEROXIA.
Defence Research Board, Ottawa (Ontario).
T. N. Pogorelova. May 67, 5p T-483-R
Transl. Into English From Dokl. Akad. Nauk Sssr (Moscow), V. 167, No. 6, 1966 P 1421-1422

Descriptors: *Amino acid, *Brain, *Hyperoxia, *Rabbit, Acid, Amino, Animal, Chromatography, Oxygen, Paroxysm, Pressure, Study, Thalamus.

For abstract, see STAR 05 21.
N67-35903 HC$3.00 MF$0.65

Group 6P—Physiology

ACCLIMATIZATION.
Acclimatisation
Scientific Translation Service, La Canada, Calif.
R. Virchow. Jul 67, 13p NASA-TT-F-11147
Contract NASW-1496
Transl. Into English From Z. Ethnologie (Germany), 1885 P 202-214

Descriptors: *Acclimatization, *Subtropics, *Tropics, Body, Climate, Effect, Human, Temperature.

For abstract, see STAR 05 21.
N67-36181 HC$3.00 MF$0.65

THE DEVELOPMENT OF A READING MACHINE FOR THE BLIND.
Mauch Labs., Dayton, Ohio.
For primary bibliographic entry see Field 9B.
PB-176 090 HC$3.00 MF$0.65

6Q. Protective Equipment

EVALUATION OF A WET SUIT IN CONJUNCTION WITH ANTI-BLACKOUT PROTECTION,
Naval Air Development Center Johnsville Pa Aerospace Medical Research Dept
Robert M. Patton. 3 Aug 67, 14p Rept no.
NADC-MR-6713

Descriptors: (*Pressure suits, Acceleration tolerance), Blackout (Physiology), Effectiveness, Acceptability, Space medicine.
Identifiers: Wet suits.

An investigation was undertaken to test and evaluate a wet suit worn in conjunction with the Mark II anti-G suit under acceleration. Eight subjects were run on the centrifuge under conditions of no protection, wearing an anti-G suit only, wearing an anti-G suit under the wet suit, and wearing the anti-G suit over the wet suit. Results indicated that acceleration tolerance was significantly improved by the use of the anti-G suit, but there was no statistically reliable difference between the anti-G suit only and the two anti-G suit/wet suit combinations. (Author)
AD-658 508 HC$3.00 MF$0.65

TEST OF ACOUSTI-GUARD (EAR PROTECTIVE DEVICE).
Army Medical Research Lab Fort Knox Ky
5 Nov 43, 5p

Descriptors: (*Ear protectors, Efficiency), Blast, Tests, Acoustic insulation, Effectiveness.

The degree of protection provided by the Acoustiguard Ear Protective against injurious high-level sound intensities, such as from gun blast, was determined.
AD-658 599 HC$3.00 MF$0.65

TEST OF GLASSES, SUN,
Army Medical Research Lab Fort Knox Ky
Lester B. Roberts. 29 Mar 45, 3p

Descriptors: (*Eyeglasses, Effectiveness), Tests, Safety, Visual acuity, Optical properties, Light, Colors, Design.

The primary purpose of sun glasses is to reduce the effect of excessive glare at high light levels. One-density sun glasses cannot do this optimally for all glare conditions because of the wide range of light intensity and distributions encountered. A one-density universal sun glass must, therefore, represent a compromise with density somewhere in the range between the density of ski goggles and the density necessary to overcome mild glare. Used within this range, and for glare relief only, well designed sun glasses are effective and beneficial and will result in better seeing. Used outside this range, they may be inadequate and actually reduce seeing ability. This report considers the adequacy of the subject sun glasses for use within this 'average' glare range. (Author)
AD-658 642 HC$3.00 MF$0.65

DEVELOPMENT OF EAR PROTECTOR, ELECTROACOUSTIC, MX-7307 ()/UIC.
Quarterly rept. no. 2, 1 Mar-31 May 67,
CBS Labs Stamford Conn
John R. Pavlick. Aug 67, 8p
ECOM-0053-2
Contract DAAB07-67-C-0053
See also AD-653 794.

Descriptors: (*Ear protectors, Blast), Armored vehicles, Intercommunication systems, Acoustic equipment.

The report contains a summary of the work performed for the design and construction of an Ear Protector, Electroacoustic to be used with Intercommunication Set AN/VIC-1 when installed in armored vehicles provided with electrically fired weapons. The Ear Protector provides a pulsed tone into the crewmen's ears prior to the firing of the weapon, which protectively conditions the ears against injurious blasts of the fired weapon. (Author)
AD-658 681 HC$3.00 MF$0.65

6R. Radiobiology

AVERSION TO SUCROSE PRODUCED BY CONTINGENT X-IRRADIATION: TEMPORAL AND DOSAGE PARAMETERS,
Army Medical Research Lab Fort Knox Ky
Samuel H. Revusky. 30 Jun 67, 16p Rept no. USAMRL-740

Descriptors: (*Sucrose, Ingestion (Physiology)), (*Radiation sickness, *Ingestion (Physiology)), Rats, Behavior, Consumption, X rays, Radiation effects.

Rats were made familiar with milk in the course of five days. A few days later, experimental Ss were permitted to drink sucrose solution and, from 3.5 to 32 hours afterward, were exposed to 50 roentgens of X-rays. Sham controls were treated in the same way except that they were not X-irradiated. Irradiated controls ate chow instead of drinking sucrose solution prior to irradiation. In a subsequent preference test between sucrose solution and milk, those experimental animals irradiated 6.5 hours or less after sucrose consumption exhibited an aversion to sucrose relative to both type of controls. In a similar later experiment, rats were exposed to 50, 150 or 250 roentgens, 7 hours after they consumed sucrose solution. Subsequent aversion to sucrose solution increased with increasing radiation dose. It is conjectured that similar associations over long time intervals may be involved in the regulation of food intake. (Author)
AD-658 969 HC$3.00 MF$0.65

SUGAR RETENTION, COFACTOR LEVELS, AND LEAKAGE OF METABOLITES IN X-IRRADIATED, STARVED YEAST CELLS.
Final rept.,
Army Medical Research Lab Fort Knox Ky
R. J. Doyle, and Edward Spoerl. 30 Jun 67, 16p Rept no. USAMRL-742

Descriptors: (*Yeasts, Radiation effects), (*Cells (Biology), Radiation effects), (*Metabolism, *Radiation effects), (*Carbohydrates, Metabolism), Tracer studies, Culture media, Starvation, Vitamin B complex, Salts, Carbon dioxide, Coenzymes, Adenosine phosphates, Nucleotides, X rays.

Irradiated cells retained a greater portion of (14C)sorbose, though rates of efflux were similar during a first phase of exit and rates of uptake were similar. The thiamine pyrophosphate content of irradiated cells was greater than that of unirradiated cells, whereas pyruvate decarboxylase activities and ATP and DPN contents were similar. Similar amounts of 260 millimicrons absorbing materials were lost by irradiated and unirradiated cells during starvation. Incubation with glucose or maltose increased the total loss, while incubation with severa less readily metabolized sugars or with hexitols increased the relative loss from irradiated cells. (Author)
AD-658 971 HC$3.00 MF$0.65

HOMOGRAFT RESPONSE IN ADULT-THYMECTOMIZED MICE: DEFICIENCY WITH AGING AND AFTER LOW DOSE-RATE GAMMA-IRRADIATION,
Naval Radiological Defense Lab San Francisco Calif
William E. Davis, Jr. and Leonard J. Cole. 4 Aug 67, 25p Rept no. USNRDL-TR-67-92

Descriptors: (*Transplantation, *Radiation effects), (*Immunology, Radiation effects), Skin, Antigen-antibody reactions, Mice, Aging (Physiology), Thymus, Excision, Gamma rays, X rays.

The homograft response to skin grafts of varying antigenic disparity was measured at 15-20 months of age in mice thymectomized at 8 weeks of age. The response to male isografts was delayed more in thymectomized female recipients than in intact recipients. Exposure of female mice to sublethal X radiation (at 10-11 weeks of age) resulted in a further delay in intact recipients and abrogated the response in the thymectomized recipients. Other intact but aged mice showed a slight impairment of response to skin grafts differing at non-H-2 loci. In thymectomized groups, this impairment was increased. Exposure of both intact or thymectomized mice (at 9 months of age) to 1133 rad of low dose rate gamma-radiation (1.4 rad/hr) resulted in an increased delay in response relative to the nonirradiated groups. In all cases, the non-H-2 grafts were the most affected by radiation and thymectomy. It is concluded: (1) After adult thymectomy, the homograft response becomes deficient in old mice, particularly as regards male or non-H-2 isoantigens. (2) Chronic gamma-irradiation after thymectomy further increases this deficiency, presumably by creating a greater demand for new immunocompetent cells and/or by eliciting defects in their precursors. (Author)
AD-659 026 HC$3.00 MF$0.65

EFFECTS OF DOSE AND OF PARTIAL-BODY EXPOSURE ON CONDITIONING THROUGH A RADIATION-INDUCED HUMORAL FACTOR,
Naval Radiological Defense Lab San Francisco Calif
Edward L. Hunt, Harold W. Carroll, and Donald J. Kimeldorf. 3 Aug 67, 25p Rept no. USNRDL-TR-67-95

Descriptors: (*Conditioned reflex, *Radiation effects), Rats, Behavior, Motivation, X rays, Taste, Blood circulation, Learning.
Identifiers: Parabiosis.

X-irradiation (360 R) of one member of a parabiotic rat pair (united by skin-vascular anastomosis) can serve to motivate a conditioned aversion to saccharin-flavored fluid in its completely-shielded partner. The induction of a circulating humoral factor that acts as a noxious stimulus was investigated further in the parabiotic preparation. The degree of conditioning of a saccharin aversion in the shielded partner was significantly reduced with exposure of the irradiated member to a lower dose of 180 R. No evidence of conditioning was obtained when the irradiated member was exposed to 180 or 360 R when the head or the remainder of the body was shielded. It was concluded that

induction and transfer of the humoral factor resulted from effects produced in both regions of the body and is not related simply to the mass of tissue exposed. Loss of the effectiveness of irradiation in the exposed member, because of circulatory pooling of the humoral factor with the shielded partner, was also investigated. A marked conditioned aversion to saccharin was obtained in the irradiated member with a 12 R exposure only when its partner was equally exposed and dilution by pooling was precluded. It was concluded that a 12 R exposure induced a humoral factor which was diluted by circulatory pooling with a shielded partner. (Author)
AD-659 028 HC$3.00 MF$0.65

PLUTONIUM ABSTRACTS. VOLUME 7, NUMBER 4,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
BNWL-446-Vol-7-No-4 HC$3.00 MF$0.65

RADOS A CODE TO ESTIMATE GAMMA DOSE FROM A CLOUD OF RADIOACTIVE GASES,
du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
DP-1098 HC$3.00 MF$0.65

USE OF ULTRASONICS TO INVESTIGATE SOFT TISSUE THICKNESSES ON THE HUMAN CHEST.
Atomic Energy Establishment, Winfrith (England). Radiological and Safety Div.
For primary bibliographic entry see Field 6C.
For abstract, see STAR 05 21.
N67-35845 HC$3.00 MF$0.65

RADIONUCLIDE STANDARDIZATION. A BIBLIOGRAPHY,
National Center for Radiological Health, Rockville, Md.
For primary bibliographic entry see Field 18B.
PB-176 049 HC$3.00 MF$0.65

6S. Stress Physiology

DECREASED ATROPINE TOXICITY IN RATS CHRONICALLY EXPOSED TO COLD,
Pittsburgh Univ Pa Dept of Pharmacology
For primary bibliographic entry see Field 6T.
AD-658 462 HC$3.00 MF$0.65

THE EFFECT OF WATER IMMERSION AND BODY POSITION UPON PERCEPTION OF THE GRAVITATIONAL VERTICAL,
Naval Air Development Center Johnsville Pa Aerospace Medical Research Dept
John G. Nelson. 18 Jul 67, 27p Rept no. NADC-MR-6709

Descriptors: (*Proprioception, *Vestibular apparatus), Posture, Gravity, Accuracy, Head, Water, Space medicine.
Identifiers: Water immersion, Tilt tests.

The purpose of this study was to measure the accuracy, particularly the sensitivity or short-term repeatability, with which humans can use their vestibular sense to preceive the gravitational vertical, and how this ability varies with body (head) position. Equipment and procedures to reduce or eliminate nonvestibular cues were selected through iterative process of design, development, test, and evaluation. Ss were restrained upon an underwater 2-axis tilt table, and required to position themselves, via signals to Es, in one of 6 cardinal positions of the body (head) with respect to gravity. Seven Ss, in 3 immersions each, made 3 judgements per immersion at each of the 6 positions. The group responses showed some large and significant constant error, most notably a pitch-forward bias shared (unequally) by all of the medial-plane positions, exceeding 30 degrees in the nominal head-down position. A Probable Error, (PE), uninflated by constant errors, was computed for each of the 2 orthogonal directions of deviation for each of the 6 positions. The results supported the classical concept of reduced sensitivity in the head-down as compared with the head-up positions. However, PE ranged from 15 degrees to 40 degrees, indicating only a marginally useful sensitivity in any position. In addition, sensitivity at any one position was not necessarily symmetrical as to direction of deviation, and some sensitivities at intermediate values of tilt overlapped head-up or head-down sensitivities. (Author)
AD-658 507 HC$3.00 MF$0.65

EVALUATION OF A WET SUIT IN CONJUNCTION WITH ANTI-BLACKOUT PROTECTION,
Naval Air Development Center Johnsville Pa Aerospace Medical Research Dept
For primary bibliographic entry see Field 6Q.
AD-658 508 HC$3.00 MF$0.65

CROSS-MODALITY ESTIMATION OF ANGULAR VELOCITY.
Interim rept.,
Army Medical Research Lab Fort Knox Ky
James H. Brown. 26 Jun 67, 13p Rept no. US-AMRL-738

Descriptors: (*Acceleration, Responses), Habituation learning, Nystagmus, Auditory signals, Vestibular apparatus, Psychophysics, Proprioception, Adaptation (Physiology), Rotation, Velocity, Acceleration tolerance.

The exponent of 1.0 found previously for numerical magnitude estimates of angular velocity during passive rotation was validated by auditory cross-modality estimates. Acceleration intensities ranged from 3 degrees/sec sq to 24 degrees/sec sq, with durations varying from 10 sec. to 80 sec. It was concluded that adaptation evident in responses to the longer duration stimuli is a real phenomenon and of potential significance as one form of disorientation. (Author)
AD-658 657 HC$3.00 MF$0.65

RESTLESSNESS AND LIFE-SUSTAINING ACTIVITIES DURING FOUR DAYS OF SENSORY DEPRIVATION,
Naval Medical Research Inst Bethesda Md
Seward Smith, Thomas I. Myers, and Donald B. Murphy. 1967, 4p
NAVMED-MF022.01.03-1005-1
Availability: Published in Psychon. Sci. v8 n12 p523-4 1967.

Descriptors: (*Sensory deprivation, Tests), Diurnal variations, Adjustment (Psychology), Reaction (Psychology), Time, Adaptation (Physiology), Vision.

Ss undergoing four-day dark, quiet sensory deprivation (SD) showed more restlessness and life-sustaining activity during the day than at night. These results contrast with retrospective reports of disrupted diurnal cycles. Daytime restlessness increased over days. Day 2 daytime restlessness predicted later requests for release and, among early release (ER) Ss, correlated inversely with time in isolation. ER Ss were more restless the hour before termination than were all other Ss during that hour. (Author)
AD-658 940 Not available from CFSTI.

STUDY OF THE CUMULATIVE EFFECT OF IMPACT ACCELERATIONS.
Issledovaniye Kumulyativnogo Deystviya Udarnykh Peregruzok
National Aeronautics and Space Administration, Washington, D. C.
V. A. Elivanov, S. A. Gozulov, and N. P. Morozova. Aug 67, 7p NASA-TT-F-11134
Transl. Into English From Kosmich. Biol. I Med. (USSR), V. 1, No. 2, 1967 P 22-26

Descriptors: *Impact acceleration, *Rat, Acceleration, Cumulative, Impact, Landing, Lesion, Organ, Resistance, Subcritical, Supercritical, Tissue, Velocity.

For abstract, see STAR 05 21.
N67-36123 HC$3.00 MF$0.65

EXTREMAL FACTORS OF LONG-TERM SPACE FLIGHT AND HEALTH REQUIREMENTS FOR SPACECRAFT CREWS.
Ekstremal'nyye Faktory Dlitel'nogo Kosmi- Cheskogo Poleta I Trebovaniya K Sostoyaniyu Zdorov'ya Chlenov Ekipazhey Kosmicheskikh Korabley
National Aeronautics and Space Administration, Washington, D. C.
P. V. Buyanov, and V. G. Terentyev. Aug 67, 4p NASA-TT-F-11136
Transl. Into English From Kosmich. Biol. I Med. (USSR), Vol. 1, No. 2, 1967 P 52-54

Descriptors: *Aerospace medicine, *Health, *Personnel selection, Aerospace, Astronaut, Crew, Duration, Examination, Factor, Long, Medical, Medicine, Mission, Personnel, Requirement, Selection, Space, Spacecraft.

For abstract, see STAR 05 21.
N67-36480 HC$3.00 MF$0.65

6T. Toxicology

COLORIMETRIC PERSONAL DOSIMETER FOR HYDRAZINE FUELS.
Mine Safety Appliances Co Pittsburgh Pa
For primary bibliographic entry see Field 6A.
AD-658 442 HC$3.00 MF$0.65

DECREASED ATROPINE TOXICITY IN RATS CHRONICALLY EXPOSED TO COLD,
Pittsburgh Univ Pa Dept of Pharmacology
S. C. Kalser, D. Evans, E. Forbes, M. Kelly, and E. Kelvington. Sep 67, 25p
AFOSR-67-2105
Grant AF-AFOSR-87-66

Descriptors: (*Atropine, *Toxic tolerances), (*Exposure, Toxic tolerance), Alkaloids, Toxicity, Rats, Cold weather tests, Acclimatization, Parenteral infusions, Absorption (Biological).

Environmental conditioning to cold has been shown to be able to alter the toxicity of atropine sulfate to rats when administered by an i.p., but not by an i.v. route. Rats exposed to 5C for 49 days tolerate twice the amount of atropine sulfate tolerated by rats exposed to 5C for only 1 day. This tolerance appears to correlate with a slower absorption of the drug from the peritoneal cavity compared with the absorption rates for acutely cold-exposed rats, or rats maintained at 25C. Although excretion of drug into the urine and bile is not higher for the chronic cold animal, its tissue distribution is somewhat lower. This is consistent with the suggestion that the cold-acclimated rat decreases the toxicity of atropine by limiting absorption rather than by increasing excretion. (Author)
AD-658 462 HC$3.00 MF$0.65

DETERMINATION OF THE CHARACTERISTICS AND EFFECTS UPON THE CREW OF GUN FUMES FROM FIRING OF THE WEAPONS IN THE M4A4E1 TANK.

Final rept.,
Army Medical Research Lab Fort Knox Ky
Norton Nelson, Steven M. Horvath, Ludwig Eichna, and Robert Walpole. 29 Apr 43, 6p
Rept. on proj. 'Toxic Gases in Armored Vehicles'.

Descriptors: (*Tanks (Combat vehicles), *Ventilation), (*Toxic tolerances, Personnel), Carbon monoxide, Air pollution, Gun smoke, Blood analysis, Machine guns, Ammonia.

The purpose of the report is to determine the extent of the hazard from fumes released by firing of the weapons in the M4A4E1 tank with 105mm howitzer. Air samples were analyzed for carbon monoxide and ammonia; bloods taken from the crew members before and after firing were analyzed for carbon monoxide hemoglobin. Results of the present test are presented. (Author)
AD-658 574 HC$3.00 MF$0.65

DETERMINATION OF THE CHARACTERISTICS AND EFFECTS UPON THE CREW OF GUN FUMES FROM FIRING OF THE WEAPONS IN THE M7 TANK.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Norton Nelson, Steven M. Horvath, R. H. Walpole, and L. W. Eichna. 8 Apr 43, 10p
Rept. on proj. 'Toxic Gases in Armored Vehicles'.

Descriptors: (*Tanks (Combat vehicles), *Ventilation), (*Toxic tolerances, Personnel), Carbon monoxide, Air pollution, Gun smoke, Blood analysis, Machine guns, Ammonia, Tests.

The purpose of the report is to determine the extent of the hazard from fumes released by firing of the weapons in the M7 Tank. Air samples were analyzed for carbon monoxide and ammonia by methods previously reported. Analysis for nitrous fumes were not carried out, earlier studies with the same ammunition having indicated the absence of any significant amounts. Results of the tests are given. (Author)
AD-658 575 HC$3.00 MF$0.65

EFFECT OF ENDOTOXIN ON IRON ABSORPTION,
Walter Reed Army Inst of Research Washington D C
Stanley Cortell, and Marcel E. Conrad. 13 Dec 66, 5p
Availability: Published in The American Journal of Physiology v213 n1 p43-7 Jul 1967.

Descriptors: (*Toxins + antitoxins, Absorption (Biological)), (*Iron, Absorption (Biological)), Metabolism, Parenteral infusions, Intestines, Blood chemistry, Toxicity, Histology, Glucose, Membranes (Biology), Mucus, Cells (Biology).

Endotoxin caused marked abnormalities in iron absorption and metabolism within hours after the administration of a parenteral dose. The changes observed during the 1st day following injection were unique; there was decreased absorption of iron with a normal intestinal iron content, an accelerated rate of clearance of iron from plasma, and a decreased serum iron concentration. That a generalized cytotoxic effect upon the gut was not the cause of these changes was suggested by the normal intestinal histology and lifespan of mucosal cells, normal absorption of glucose and unchanged excessive absorption of iron by iron-depleted, endotoxin-treated animals. Two days after the administration of endotoxin most abnormalities became normal except that the intestinal iron content increased, and a significant decrease in iron absorption persisted. It was only during this later period that iron-depleted rats had decreased absorption of iron from the gut. It was postulated that the acute absorptive defect was caused by a decreased capability to transfer iron from the mucosal cell into the body, whereas the late defect was associated with impaired entry of intraluminal iron into the intestinal absorptive cells. (Author)
AD-658 605 Not available from CFSTI.

TOXIC GASES IN ARMORED VEHICLES. DETERMINATION OF THE CHARACTERISTICS AND EFFECTS UPON THE CREW OF GUN FUMES FROM FIRING OF THE WEAPONS IN TANKS OF THE M5 SERIES.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 638 HC$3.00 MF$0.65

LUNG CHANGES RESULTING FROM PROLONGED EXPOSURE TO 100% OXYGEN AT 550 mm Hg.
Naval Air Development Center Johnsville Pa Aerospace Medical Research Dept
For primary bibliographic entry see Field 6E.
AD-658 720 HC$3.00 MF$0.65

IMMUNOGENIC RESPONSE OF THE VENOMS OF FER-DE-LANCE (BOTHROPS ATROX ASPER) AND LACASCABELLA (CROTALUS DURISSUS DURISSUS) FOLLOWING PHOTOOXIDATIVE DETOXIFICATION.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Walter F. Kocholaty, Joyce C. Goetz, Billy D. Ashley, Thomas A. Billings, and Edith B. Ledford. 30 Jun 67, 18p Rept no. USAMRL-743

Descriptors: (*Venoms, *Immunology), (*Detoxification, Venoms), Oxidation, Photochemistry, Methylene blue, Enzymes, Rabbits, Gamma globulin, Mice, Immune serums, Reptiles.
Identifiers: Bothrops atrox, Crotalus durissus.

Photooxidation of crude B. atrox asper and C. durissus durissus venom by visible light in the presence of methylene blue resulted in the detoxification of these venoms and a considerable reduction of some enzymatic activities. Immunization of rabbits with the photooxidized venoms and isolation of their gamma-globulins revealed that the immunoglobulins obtained with B. atrox asper venom did not protect mice from the effects of this venom while the gamma-globulins from C. durissus durissus animals gave a very high degree of protection. The possible cause of this discrepancy is discussed. (Author)
AD-658 972 HC$3.00 MF$0.65

IMMUNIZATION STUDIES WITH NAJA NAJA VENOM DETOXIFIED BY PHOTOOXIDATION.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Walter F. Kocholaty, Edith B. Ledford, Thomas A. Billings, Joyce C. Goetz, and Billy D. Ashley. 30 Jun 67, 16p Rept no. USAMRL-744

Descriptors: (*Venoms, *Immunology), (*Detoxification, Venoms), Oxidation, Photochemistry, Methylene blue, Enzymes, Rabbits, Gamma globulin, Immune serums, Reptiles.
Identifiers: Naja naja.

Photooxidation of cobra venom by visible light in the presence of methylene blue resulted in a relatively slow detoxification of the venom. The gamma-globulin isolated from rabbits immunized with the detoxified venom gave poor protection in the animal experiments. Possible reasons for the weak response of the immune serum are discussed. (Author)
AD-658 973 HC$3.00 MF$0.65

EFFECT OF THE ROUTE OF ADMINISTRATION ON THE NEUTRALIZING POTENCY OF ANTIVENINS.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Walter F. Kocholaty, Thomas A. Billings, Billy D. Ashley, Edith B. Ledford, and Joyce C. Goetz. 30 Jun 67, 19p Rept no. USAMRL-745

Descriptors: (*Venoms, *Immunology), (*Bites + stings, Therapy), (*Immune serums, Effectiveness), Protection, Tests, Injection, Parenteral infusions, Toxins + antitoxins.

Using a variety of venoms, it was demonstrated that the route of administration has a decisive influence in the demonstration of the protective effect of a given antivenin. It is suggested that in testing the efficacy of an immune serum, both intravenous and intraperitoneal administration should be given consideration. (Author)
AD-658 974 HC$3.00 MF$0.65

PATHOPHYSIOLOGICAL STUDIES OF TEN POISONOUS SNAKE VENOMS.
Rept. for Jan 65-Jun 66,
Edgewood Arsenal Md
James A. Vick, Henry P. Ciuchta, James H. Manthei, and Richard DeGraff. Jul 66, 36p Rept no. EA-SP-100-27

Descriptors: (*Venoms, Pathology), Reptiles, Physiology, Dogs, Mice, Lethal dosage, Respiration, Electroencephalography, Electrocardiography, Blood pressure.

In an attempt to determine the exact physiological changes that follow the administration of a lethal dose of snake venom, the following studies were carried out: One thousand eight hundred and sixty-four mice and two hundred and forty-seven dogs were injected with varying doses of venom and changes in EEG, heart rate, EKG, respiration and blood pressure followed until death. Results indicate that on a mg/kg basis, the lethal dose of venom for the dog is significantly less than that for the mouse and that the mechanism of death for most venoms is respiratory in nature. (Author)
AD-658 986 HC$3.00 MF$0.65

FIVE-DAY REPEATED INTRAVENOUS ADMINISTRATION - RHESUS MONKEYS,
Hazelton Labs., Inc., Falls Church, Va.
For primary bibliographic entry see Field 6O.
PB-175 956 HC$3.00 MF$0.65

7. CHEMISTRY

7A. Chemical Engineering

EXTERNAL FLOWS OF VISCOELASTIC MATERIALS: FLUID PROPERTY RESTRICTIONS ON THE USE OF VELOCITY-SENSITIVE PROBES.
Technical rept.,
Delaware Univ Newark Dept of Chemical Engineering
A. B. Metzner, and Gianni Astarita. 1967, 8p
Contract Nonr-2285 (03)
Availability: Published in AIChE Journal v13 n3 p550-5 May 1967.

Descriptors: (*Fluid flow, *Viscoelasticity), Probes, Velocity, Flowmeters, Boundary layer, Thickness, Leading edge, Stagnation point, Materials.
Identifiers: Deborah number.

The more pronounced macroscopic features of flows of viscoelastic materials around submerged objects are considered in the light of restrictions imposed on the flow by the Deborah number, a dimensionless group representing a ratio of time scales of the fluid and the flow process. It is seen that one major effect is to thicken the boundary layer appreciably in the region of the leading edge or stagnation point of the object in the fluid; depending on the shape of the object this thickening of the boundary layer may be felt for appreciable distances into the velocity field. The influence of

these and other effects on the use of probes for determination of point values of the velocity of viscoelastic fluids is considered in some detail. The general effect is to impose strong restrictions on the use of such probes and on the interpretation of measurements made with them. These predicted limitations are supported, in a general way, by recent experimental measurements; thus the present macroscopic analysis appears to define several major effects to be considered in subsequent, more detailed investigations. (Author)
AD-658 523 Not available from CFSTI.

ENGLISH TRANSLATIONS OF USSR TECHNICAL PUBLICATIONS ON DESALINATION OF WATER, 1966.
Technical Information Extension (AEC), Oak Ridge, Tenn.

1966, 225p
TT-67-62806
Trans. from mono. Tsentralnoe Byuro Nauchno-Tekhnicheskoi Informatsii. Rept., Moscow, 1966.

Descriptors: (*Sea water, *Desalination), (*Water supplies, Distillation), Power reactors, Nuclear power plants, Costs, Evaporators, Purification.

For abstract, see NSA 21 19.
AEC-tr-6885 HC$3.00 MF$0.65

SEPARATION OF PLUTONIUM FROM PLATINUM BY COPRECIPITATION WITH FERRIC IRON FOLLOWED BY ION EXCHANGE ON INORGANIC EXCHANGE MATERIALS,
Los Alamos Scientific Lab., N. Mex.
G. L. Johnson, and E. B. Fowler. 15 May 67, 8p
Contract W-7405-eng-36

Descriptors: (*Plutonium, Separation), (*Platinum, Recovery), Ion exchange, Chemical precipitation.

For abstract, see NSA 21 19.
LA-3149 HC$3.00 MF$0.65

ALIGNMENT CHARTS FOR TRANSPORT PROPERTIES VISCOSITY, THERMAL CONDUCTIVITY, AND DIFFUSION COEFFICIENTS FOR NONPOLAR GASES AND GAS MIXTURES AT LOW DENSITY.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 7D.
PB-175 886 HC$3.00 MF$0.65

SPECTROPHOTOMETRY OF NEPTUNIUM IN NITRIC ACID SOLUTIONS,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
Andrew J. Johnson, and Glenn A. Shepherd. 7 Jul 67, 9p
Contract AT (29-1)-1106

Descriptors: (*Neptunium, *Spectrophotometers), (*Nitric acid, Solutions), Oxidation, Absorption spectrum, Solvent extraction, Ion exchange.

For abstract, see NSA 21 19.
RFP-958 HC$3.00 MF$0.65

7B. Inorganic Chemistry

SENSITIVITY OF MANGANESE DETERMINATION BY ATOMIC ABSORPTION SPECTROMETRY USING FOUR SOLVENTS.
Revised ed.,
Walter Reed Army Inst of Research Washington D C
Fredric J. Feldman, Robert E. Bosshart, and Gary D. Christian. 16 May 67, 3p
Revision of manuscript submitted 19 Dec 66.
Availability: Published in Analytical Chemistry v39 p1175-7 Aug 1967.

Descriptors: (*Manganese, *Microanalysis), (*Atomic spectroscopy, Manganese), Solvents, Acetones, Pentanones, Ethanols, Water, Absorption spectrum.
Identifiers: Methyl pentanones.

The paper describes a study of the atomic absorption spectrometry of manganese in four solvents: acetone, methyl isobutyl ketone, ethanol, and water. Optimum conditions for the determination of trace amounts of manganese are reported. Possible relationships between the physical properties of the four solvents and the absorbance of the manganese are presented and discussed. With acetone as the solvent as little as 2 ppb of manganese can be determined directly. (Author)
AD-658 608 Not available from CFSTI.

NEW HYPOFLUORITES CONTAINING NITROGEN.
Annual rept. no. 4, 1 Oct 66-30 Sep 67,
Idaho Univ Moscow
Jeanne M. Shreeve. 1 Oct 67, 65p
Contract Nonr-4217 (00), ARPA Order-442
See also AD-640 893.

Descriptors: (*Oxyfluorides, Synthesis (Chemistry)), (*Fluorine compounds, Synthesis (Chemistry)), (*Fluoroamines, Synthesis (Chemistry)), (*Nitrogen compounds, Synthesis (Chemistry)), Cyanates, Addition reactions, Ketenes, Amines, Imines, Sulfates, Ureides, Oxidizers, Halogenated Hydrocarbons, Catalysis.
Identifiers: Bis (trifluoromethyl) ketenes, Nitrosyl fluoride, Perfluoro ureas, Sulfuryl fluoride isocyanates, Tris (trifluoromethyl)hydroxylamines.

Contents: Addition to the carbon-nitrogen double bond of fluorosulfuryl isocyanate, FSO2NCO; Derivatives of bis (trifluoromethyl) ketene which contain fluorosulfato, difluoroimino, and/or fluoroxy groups; Some chemistry of difluoraminocarbonyl fluoride, NF2CFO; The preparation of perfluorourea, (NF2)2CO, and difluoroaminocarbonyl chloride NF2C (O)Cl; New preparations for NF2OCF3 and NF2Cl; A simple method for the preparation of nitrosyl fluoride; The silver (II) fluoride-catalyzed formation of tris (trifluoromethyl(hydroxylamine, (CF3)2NOCF3.
AD-658 735 HC$3.00 MF$0.65

THE CRYSTAL STRUCTURE OF NEODYMIUM MONOTELLUROOXIDE-Nd2O2Te,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20B.
AD-658 765 Not available from CFSTI.

ORGANOMETALLIC SULFUR COMPLEXES. VIII. THE MOLECULAR STRUCTURE OF A DOUBLY SULFUR-BRIDGED DIMERIC COMPLEX OF MOLYBDENUM (V), (C5H5MoO)2S2, CONTAINING A Mo-Mo INTERACTION,
Wisconsin Univ Madison Dept of Chemistry
Donald L. Stevenson, and Lawrence F. Dahl. 20 Feb 67, 9p
AFOSR-67-2210
Grant AF-AFOSR-518-66
See also AD-655 958.
Availability: Published in Journal of the American Chemical Society v89 n15 p3721-6 Jul 19 1967.

Descriptors: (*Metalorganic compounds, *Complex compounds), (*Sulfur compounds, Complex compounds), (*Molybdenum compounds, Complex compounds), Molecular structure, Crystal structure, Molecular association, Crystal lattices, Cycloalkenes, Magnetic properties.

A structural determination of (C5H5MoO)2S2 revealed the first known example of an organometallic complex which contains doubly bridging sulfur atoms linking two transition metals. Crystals of (C5H5MoO)2S2 are triclinic with reduced cell parameters of a = 6.62A, b = 8.73A, c = 10.68A, alpha = 95 deg. 40', beta = 92 deg. 56', and gamma = 100 deg. 49'. The space group is Pl; there are two molecules per unit cell with each molecule located on a crystallographic canter of symmetry. If each cyclopentadienyl ring is considered to occupy three bonding sites, the idealized dimeric species can be described as two octahedra sharing a common edge bisected by a direct Mo-Mo bond which is proposed to account for the observed diamagnetism of the complex. A detailed comparison of the structural features of (C5H5MoO)2S2 with those of related oxo-bridged molybdenum systems is given. (Author)
AD-658 798 Not available from CFSTI.

NMR STUDIES OF INTRA- AND INTERMOLECULAR INTERACTIONS.
Colorado Univ Boulder
For primary bibliographic entry see Field 7D.
AD-658 861 HC$3.00 MF$0.65

NEW PHASE TRANSFORMATION IN InSb AT HIGH PRESSURE AND HIGH TEMPERATURE,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 7D.
AD-658 915 Not available from CFSTI.

KINETIC STUDIES OF THE REACTIONS OF ANIONS WITH DIFLUORAMINE,
Hercules Research Center Wilmington Del
For primary bibliographic entry see Field 7D.
AD-658 921 Not available from CFSTI.

ORGANOMETALLIC SULFUR COMPLEXES. IX. STRUCTURE OF A HEXANUCLEAR COBALT CARBONYL SULFUR COMPLEX, (SCo3 (CO)7)2S2, CONTAINING A TETRAMETAL-COORDINATED BRIDGING DISULFIDE GROUP,
Wisconsin Univ Madison Dept of Chemistry
Donald L. Stevenson, Vincent R. Magnuson, and Lawrence F. Dahl. 20 Feb 67, 9p
AFOSR-67-2191
Grant AF-AFOSR-518-66
See also AD-658 798.
Availability: Published in Journal of the American Chemical Society v89 n15 p3727-32 Jul 19 1967.

Descriptors: (*Metalorganic compounds, *Complex compounds), (*Sulfur compounds, Complex compounds), (*Cobalt compounds, Complex compounds), (*Metal carbonyls, Complex compounds), Crystal structure, X-ray diffraction analysis, Molecular association, Molecular structure, Crystal lattices.

An X-ray analysis of (SCo3 (CO)7)S2 established the first known case of a disulfide bridging group symmetrically coordinated to four transition metal atoms. The molecular configuration of approximate C2v-2mm symmetry consists of two essentially identical SCo3 (CO)7 moieties linked to each other by a disulfide bridge. This diamagnetic complex crystallizes with two molecules in a reduced triclinic unit cell of symmetry Pl and of parameters a = 9.48A, b = 11.78A, c = 13.54A, alpha = 72 deg. 6', beta = 78 deg. 31', and gamma = 69 deg. 37'. Least-squares refinement based on the three-dimensional photographic data resulted in an unweighted discrepancy factor of 9.0%. A detailed comparison of the structural features of (SCo3 (CO)7)2S2 with those of its closely related chemical precursor, SCo3 (CO)9, is made. (Author)
AD-658 961 Not available from CFSTI.

THE STRUCTURE OF A TRIGONAL-BIPYRAMIDAL NICKEL (II) CYANIDE COMPLEX CON-

Group 7A—Chemical engineering

TAINING THE TETRADENTATE LIGAND TRIS (3-DIMETHYLARSINOPROPYL)PHOSPHINE,
Wisconsin Univ Madison Dept of Chemistry
Donald L. Stevenson, and Lawrence F. Dahl. 20 Feb 67, 7p
AFOSR-67-2172
Grant AF-AFOSR-518-66
Availability: Published in Journal of the American Chemical Society v89 n14 p3424-8 Jul 5 1967.

Descriptors: (*Nickel compounds, *Complex compounds), (*Phosphines, Complex compounds), Cyanides, Arsenic compounds, Molecular structure, Crystal structure, X-ray diffraction analysis.

A structural determination of (Ni (TAP)CN (+))C= 04 (-) (where TAP = tris (3-dimethyl arsinopropyl)phosphine) was undertaken in order to study the coordination of a tetradentate ligand to a Ni (II) atom. This complex crystallizes with four formula species in an orthorhombic unit cell of symmetry P2 (1)2 (1)2 (1) and of dimensions a = 10.27 A, b = 14.4 A, and c = 17.79 A. The configuration of the idealized cation, (Ni (TAP)CN (+)), is a trigonal bipyramid in which the central nickel atom is surrounded by three arsenic atoms at equatorial sites and a phosphorous atom and a cyanide group in apical positions; each arsenic atom is connected to the apical phosphorus atom by a trimethylene chain such that the cation possesses a pseudo-threefold axis. The absolute conformation of the cation in the crystal examined was determined from anomalous dispersion effects. (Author)
AD-658 962 Not available from CFSTI.

HIGH YIELD SYNTHESIS OF THE SMALLER CLOSO-CARBORANES, C2B3H5, C2B4H6 AND C2B5H7.
Technical rept.,
Aerojet-General Corp Los Angeles Calif Space-General Center for Research and Education
J. F. Ditter. 15 Aug 67, 22p Rept no. TR-13
Contract Nonr-4381 (00)

Descriptors: (*Boranes, Synthesis (Chemistry)), Pentaboranes, Carbon compounds, Pyrolysis, Fluid flow.
Identifiers: Carboranes, Dicarbaheptaboranes, Dicarbahexaboranes, Dicarbadentaboranes.

Experimental parameters for producing the small closo-carboranes C2B3H5, C2B4H6 and C2B5H7 in nearly quantitative yields from C2B4H8 were obtained. The process involves a short term, relatively high temperature flow system at low pressures. (Author)
AD-659 044 HC$3.00 MF$0.65

X-RAY WAVELENGTH CONVERSION TABLES AND GRAPHS FOR QUALITATIVE ELECTRON PROBE MICROANALYSIS.
Technical note,
National Bureau of Standards, Washington, D. C. Analytical Chemistry Div.
Kurt J. Heinrich, and Mary Ann M. Giles. 25 Sep 67, 67p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, r0.70.

Descriptors: (*X-ray spectroscopy, Tables), X-ray spectrum, Nuclear radiation spectrometers, Crystals, Atomic properties, Quantitative analysis, Microanalysis.
Identifiers: Electron microprobe.

Tables and graphs have been constructed for electron probe x-ray spectrometers equipped with crystal changers and calibrated for LiF crystals in angstroms. These tables indicate the equivalent reading for the lines which can be normally expected to appear in wavelength scans using the following crystals: LiF, EDDT, ADP, KAP, and Pb stearate (LSD). The readings were extracted from the tables of E. W. White, et al. The tables are arranged by the atomic numbers of the emitting elements; the graphs show the readings for observable lines as a function of atomic number for each of the aforementioned crystals. A suggested method for using the tables and graphs is included. (Author)
NBS-TN-406 HC$0.70 MF$0.65

THE AMMONOLYSIS OF CHLORINE OXIDES AND OF CHLOROXIFLUORIDES. COMPARING CONDUCTIVITY TESTS AND THE HALOGEN AMINES IN VOLATILE SOLUTION.
Die Ammonolyse Der Chloroxide Und Der Chloroxidfluoride. Vergleichende Leitfaehigkeitsuntersuch
ungen An Den Haloge- Naminen in Aetherischer Loesung
Technische Hochschule Munchen (West Germany). Fakultaet Fuer Allgemeine Wissenschaften.
J. N. Meussdoerffer. 1966, 59p
in German

Descriptors: *Ammonolysis, *Chlorine oxide, *Electric conductivity, *Halogen compound, Aqueous, Chlorine, Compound, Conductivity, Electric, Ether, Fluoride, Halogen, Measurement, Molecular, Oxide, Solution.

For abstract, see STAR 05 21.
N67-36663 HC$3.00 MF$0.65

PROPERTIES OF PLUTONIUM OXIDE, PART II,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
Garrel F. Molen, and Robert D. White. 12 Jul 67, 11p
Contract AT (29-1)-1106

Descriptors: (*Plutonium compounds, Oxides), Surface area, Particle size, Statistical analysis, Interactions.

For abstract, see NSA 21 19.
RFP-927-Pt-2 HC$3.00 MF$0.65

7C. Organic Chemistry

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 9B.
AD-658 439 HC$3.00 MF$0.65

A REDETERMINATION OF THE MOLAR EXTINCTION COEFFICIENTS OF AQUEOUS NITROFORM ION,
Naval Ordnance Lab White Oak Md
Arthur O. Long. 16 May 52, 7p Rept no. NAVORD-2480

Descriptors: (*Organic nitrogen compounds, *Ultraviolet spectroscopy), Ions, Absorption spectrum, Solutions.
Identifiers: Nitroform.

New measurements are presented of the ultraviolet absorption spectrum of nitroform ion in aqueous solution.
AD-658 541 HC$3.00 MF$0.65

AN IMPROVED TURBIDIMETRIC ANALYSIS OF POLYETHYLENE GLYCOL UTILIZING AN EMULSIFIER,
Walter Reed Army Inst of Research Washington D C
For primary bibliographic entry see Field 6E.
AD-658 607 Not available from CFSTI.

METHOD OF OBTAINING FLUORINATED NITROMETHANES CONTAINING HYDROGEN,
Foreign Technology Div Wright-Patterson AFB Ohio
I. V. Martynov, Yu. L. Kruglyak, I. L. Knunyants, and A. V. Fokin. 23 Feb 67, 6p Rept no. FTD-HT-66-625
Unedited rough draft trans. of Patent (USSR) 159 821, appl. 788021/23-4, 21 Jul 62.

Descriptors: (*Organic nitrogen compounds, Synthesis (Chemistry)), (*Fluorine compounds, Synthesis (Chemistry)), Chlorine compounds, Acetic acids, Chemical reactions, Patents, USSR.
Identifiers: Fluoro nitromethanes.

A method is given for obtaining fluorinated nitromethanes which contain hydrogen (for example, difluonitromethane and fluochloronitromethane) which has the distinguishing feature that a suitable nitro-halide-acetic acid (for example fluochloronitroacetic) is subjected to decarboxylizing by anhydrous potassium fluoride or water.
AD-658 610 HC$3.00 MF$0.65

NEW HYPOFLUORITES CONTAINING NITROGEN.
Idaho Univ Moscow
For primary bibliographic entry see Field 7B.
AD-658 735 HC$3.00 MF$0.65

ELECTRON SPIN RESONANCE STUDY OF HYDROGEN-ADDITION AND -REPLACEMENT REACTIONS IN SOME PYRIMIDINE COMPOUNDS,
Duke Univ Durham N C Dept of Physics
Janko N. Herak, and Walter Gordy. 6 Feb 67, 7p
AROD-4131:22
Grants DA-ARO (D)-31-124-G731, AF-AFOSR-493-66
Availability: Published in Journal of the American Chemical Society v89 n15 p3818-20 Jul 19 1967.

Descriptors: (*Pyrimidines, *Electron spin resonance), Hydrogen, Addition reactions, Free radicals, Amines, Sulfamic acids, Nitrates, Carboxylic acids.
Identifiers: Uracils.

Various derivatives of uracil in powdered form were exposed to gaseous hydrogen atoms, and the free radicals thereby produced in the samples were identified from their electron spin resonances. Only free radicals characteristic of hydrogen-bombarded uracil were observed for 5-nitrouracil and uracil-5-carboxylic acid. This indicates that the NO2 or COOH group is first replaced by hydrogen atoms to form uracil, which in turn adds hydrogen to form the observed radical. In like manner, it was found that the COOH group in uracil-6-carboxylic acid and the NH2 group in 6-aminouracil are also replaced by hydrogen atoms. In contrast, 5-aminouracil, uracil-5-sulfamic acid and 5-acetyluracil were observed to form mainly direct hydrogen-addition radicals, with the addition occurring on C6, although the substitution reaction also occurred to a lesser degree. Only radicals formed by direct hydrogen addition on C5 were observed for 6-methyluracil. Proton couplings for the various radicals were measured. (Author)
AD-658 797 Not available from CFSTI.

ORGANOMETALLIC SULFUR COMPLEXES. VIII. THE MOLECULAR STRUCTURE OF A DOUBLY SULFUR-BRIDGED DIMERIC COMPLEX OF MOLYBDENUM (V), (C5H5MoO)2S2, CONTAINING A Mo-Mo INTERACTION,
Wisconsin Univ Madison Dept of Chemistry
For primary bibliographic entry see Field 7B.
AD-658 798 Not available from CFSTI.

TRIFLUOROMETHYL FLUOROFORMATE.
Rept. for Nov-Dec 66,
Aerospace Corp El Segundo Calif Labs Div

Thimothy H. Johnston, Julian Heicklen, and Wayne K. Stuckey. May 67, 13p Rept no. TR-1001 (2250-40)-9
SSD-TR-67-38
Contract AF 04 (695)-1001

Descriptors: (*Halogenated hydrocarbons, Synthesis (Chemistry)), (*Fluorine compounds, Halogenated hydrocarbons), Oxidizers, Formates, Alkenes, Oxidation, Photochemistry, Spectra (Infrared), Mass spectrum, Nuclear magnetic resonance.
Identifiers: Trifluoromethyl fluoroformates.

Trifluoromethyl fluoroformate was prepared and isolated. Its infrared and mass spectra are recorded. (Author)
AD-658 848 HC$3.00 MF$0.65

MECHANISMS OF SUBSTITUTION REACTIONS AT SULFINYL SULFUR. IV. THE HYDROLYSIS OF SULFINYL SULFONES (SULFINIC ANHYDRIDES) IN AQUEOUS DIOXANE,
Oregon State Univ Corvallis Dept of Chemistry
John L. Kice, and Giancarlo Guaraldi. 20 Mar 67, 11p
AFOSR-67-2192
Grant AF-AFOSR-106-65
See also AD-645 911.
Availability: Published in Journal of the American Chemical Society v89 n16 p4113-21 Aug 2 1967.

Descriptors: (*Organic sulfur compounds, Substitution reactions), Hydrolysis, Solvents, Catalysis, Sulfides, Halides, Tracer studies, Reaction kinetics, Aromatic compounds.
Identifiers: Sulfinyl sulfones.

The hydrolysis of a series of aryl sulfinyl sulfones (I) was investigated under a variety of reaction conditions in acidic aqueous dioxane. The results are compared where appropriated to the hydrolytic behavior of the corresponding carboxylic anhydrides and/or sulfite esters. In the absence of nucleophilic additives, the hydrolysis of I occurs almost exclusively by a spontaneous (or uncatalyzed) pathway, even in quite acidic aqueous dioxane. This contrasts with the hydrolysis of I in acetic acid-water and also with the hydrolysis of the corresponding sulfite esters in aqueous dioxane, where, in both cases, an acid-catalyzed pathway accounts for virtually the entire rate. Reasons for these differences in behavior are outlined. The spontaneous hydrolysis of I exhibits a large solvent isotope effect, kH2O/kD2O = 2.7, and is markedly accelerated by both an increase in the percentage water in the solvent and by the presence of electron-withdrawing substituents in the aryl groups. The hydrolysis of I can be catalyzed by such nucleophilic additives as halide ions or alkyl sulfides. The halide ion catalyzed hydrolysis was studied and a mechanism proposed, and the results are compared with the halide ion catalyzed hydrolysis of sulfite esters. The alkyl sulfide catalyzed hydrolysis of I was also studied, and the results are compared with those previously obtained for the same reaction in acetic acid-1% water.
AD-658 963 Not available from CFSTI.

PREPARATIVE SCALE GAS-LIQUID CHROMATOGRAPHY OF SUBSTITUTED DIAZIRINES,
Army Missile Command Redstone Arsenal Ala Physical Sciences Lab
James A. Merritt, William N. Knopka, Ronald W. Mitchell, and Lawrence C. Robertson. 1 Aug 67, 15p Rept no. RR-TR-67-13

Descriptors: (*N-heterocyclic compounds, Separation), (*Gas chromatography, N-heterocyclic compounds), Chlorine compounds, Bromine compounds, Purification, Infrared spectroscopy, Ultraviolet spectroscopy, Mass spectroscopy.
Identifiers: Diazomethanes.

The heretofore unseparated reaction mixture resulting from the reaction of acetamidine hydrochloride with sodium hypobromite has been resolved into two pure substances: 3-chloro-3-methyldiazirine and 3-bromo-3-methyldiazirine, using preparative scale gas-liquid chromotography (GLC). The general utility of this method of purification has been extended to a series of substituted diazirines. In all cases, the resultant material was free from either contaminants or decomposition products. Product identification was accomplished by utilizing infrared and ultraviolet spectroscopy and mass spectrometry. (Author)
AD-658 988 HC$3.00 MF$0.65

THE PREPARATION AND PROPERTIES OF WELL-DEFINED GRAFT COPOLYMERS.
Research Triangle Inst Durham N C Camille Dreyfus Lab
For primary bibliographic entry see Field 11I.
AD-658 994 Not available from CFSTI.

MOLECULAR PHOTOCHEMISTRY. V. PHOTOCYCLOADDITION OF ALKYL KETONES TO ELECTRON-DEFICIENT DOUBLE BONDS,
Columbia Univ New York Dept of Chemistry
For primary bibliographic entry see Field 7E.
AD-659 015 Not available from CFSTI.

CYCLOPROPANONES. VI. REACTION OF CYCLOPROPANONE WITH AMINES,
Columbia Univ New York Dept of Chemistry
Nicholas J. Turro, and Willis B. Hammond. 23 May 67, 7p
AFOSR-67-2226
Grant AF-AFOSR-1000-66
Presented in part at the Meeting of the American Chemical Society (153th), Miami, Fla., April, 1967. See also AD-654 861.
Availability: Published in Tetrahedron Letters n32 p3085-8 1967.

Descriptors: (*Cyclopropanes, Chemical reactions), (*Ketones, Chemical reactions), (*Amines, Chemical reactions), Organic nitrogen compounds, Alcohols, Synthesis (Chemistry), Molecular structure.
Identifiers: Cyclopropanones, Anilines.

The reaction of cyclopropanone with aniline and methyl aniline was studied. Different products were obtained depending on whether an excess or deficiency of amine was employed.
AD-659 017 Not available from CFSTI.

RESEARCH ON GAS CHROMATOGRAPHIC SYSTEMS TO ANALYZE CERTAIN CHEMICAL CONSTITUENTS OF THE SURFACE OF THE MOON PROGRESS REPORT, 1 JAN. - 30 JUN. 1967.
Yale Univ., New Haven, Conn.
30 Jun 67, 4p NASA-CR-88358
Grant NSG-192

Descriptors: *Chemical analysis, *Gas chromatography, *Identification, *Organic compound, *Pyrolysis, Analysis, Chemical, Chromatography, Compound, Detection, Device, Enrichment, Gas, Infrared, Lunar, Organic, Separation, Spectrometry, Surface.

For abstract, see STAR 05 21.
N67-36639 HC$3.00 MF$0.65

7D. Physical Chemistry

REVERSIBLE OXYGEN ELECTRODES.
Pennsylvania Univ., Philadelphia. Electro-Chemistry Lab.
For primary bibliographic entry see Field 10B.
AD-482 902 HC$3.00 MF$0.65

REVERSIBLE OXYGEN ELECTRODES.
Pennsylvania Univ., Philadelphia. Electro-Chemistry Lab.
For primary bibliographic entry see Field 10B.
AD-489 312 HC$3.00 MF$0.65

EXPERIMENTAL AND ANALYTICAL STUDY OF THE H2-AIR REACTION KINETICS USING A STANDING-WAVE NORMAL SHOCK.
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 21B.
AD-658 434 HC$3.00 MF$0.65

COLORIMETRIC PERSONAL DOSIMETER FOR HYDRAZINE FUELS.
Mine Safety Appliances Co Pittsburgh Pa
For primary bibliographic entry see Field 6A.
AD-658 442 HC$3.00 MF$0.65

CLASSICAL AND QUANTAL CALCULATIONS ON ELECTRON CAPTURE.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 20J.
AD-658 445 HC$3.00 MF$0.65

A NUMERICAL SINGLE-CENTER SELF-CONSISTENT FIELD FUNCTION FOR THE HYDROGEN MOLECULE,
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 20J.
AD-658 447 HC$3.00 MF$0.65

THE KINETIC THEORY OF A PLASMA IN THE PRESENCE OF STRONG MAGNETIC FIELDS. I: GENERAL THEORY,
Aeronautical Research Associates of Princeton Inc N J
For primary bibliographic entry see Field 20I.
AD-658 460 HC$3.00 MF$0.65

STUDY OF THE SURFACE FILMS OF GAS NUCLEI (AS RELATED TO CAVITATION AND TENSILE STRENGTH IN WATER). PART III. DISSOLVING OF GAS NUCLEI IN TURBULENT FLOW.
General Electric Co Schenectady N Y Research and Development Center
For primary bibliographic entry see Field 20D.
AD-658 517 HC$3.00 MF$0.65

LIFETIME OF FLUORESCENCE FROM THE LOWEST ELECTRONIC STATE IN SULFUR DIOXIDE VAPOR.
Rochester Univ N Y Dept of Chemistry
For primary bibliographic entry see Field 7E.
AD-658 520 HC$3.00 MF$0.65

FUNCTIONAL INTEGRAL REPRESENTATION OF NONEQUILIBRIUM STATISTICAL MECHANICS,
Chicago Univ Ill Dept of Chemistry
Jan Popielawski, Stuart A. Rice, and Norman Hurt. 17 Jan 67, 13p
AFOSR-67-2186
Grant AF-AFOSR-781-67
Availability: Published in Journal of Chemical Physics v46 n10 p3707-17 May 15 1967.

Descriptors: (*Statistical mechanics, Kinetic theory), Distribution functions, Green's function, Operators (Mathematics), Perturbation theory, Brownian motion, N-body problem, Liquids.

A functional integral representation of the Green's function of the Liouville equation is presented, and it is shown how the weak-coupling expansion and the binary-collision expansion are generated from the functional integral. Furthermore, when

the interaction between particles is represented as a sum of short- and long-ranged components, it is possible to generate a new 'mixed' expansion. It is shown how this mixed expansion may be used to derive a kinetic equation descriptive of the liquid phase. Under the conditions that successive correlated binary encounters may be neglected and that the effects of the weak interaction on the dynamics of the quasibinary encounter are neglected, the Rice-Allnatt equation is recovered. A discussion of the implications of the derivation is given along with a brief description of those diagrams of the Prigogine theory which are summed in the Rice-Allnatt approximation. (Author)
AD-658 660 Not available from CFSTI.

ON THE THEORY OF EXCITONS IN LIQUIDS. II. A CLASSICAL MODEL OF POLARIZATION WAVES IN A SIMPLE LIQUID,
Chicago Univ Ill Dept of Chemistry
Gregoire Nicolis, and Stuart A. Rice. 17 Jan 67, 11p
AFOSR-67-2187
Grant AF-AFOSR-781-67
Availability: Published in The Journal of Chemical Physics v46 n11 p4445-53 Jun 1 1967.

Descriptors: (*Excitons, *Liquids), Dipole moments, Polarization, Electromagnetic waves, Atomic energy levels, Interactions, Dispersion relations.

Recent studies of the localized excited states of condensed matter have been exclusively concerned with the properties of crystalline solids. An analysis is constructed of the exciton states of a particular disordered system, namely a simple liquid. A model is presented which is an extension of the model previously used by Fano and which allows the construction of a general theory of polarization waves in which the structure of the liquid appears explicitly. Some particular cases of the general form of the dispersion relation of polarization waves are worked out in detail both in the logitudinal and transverse cases. Finally, the possible mechanisms of damping of the exciton waves are briefly discussed. (Author)
AD-658 661 Not available from CFSTI.

AUTOMATIC COUNTING OF ATMOSPHERIC AEROSOLS COLLECTED WITH THE GOETZ ULTRACENTRIFUGE.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 4A.
AD-658 667 HC$3.00 MF$0.65

FUNDAMENTAL RESEARCH IN CHEMISTRY.
Final rept.,
Cornell Univ Ithaca N Y Dept of Chemistry
Yalman Balta, and Robert T. Jacobsen. 30 Sep 67, 8p
AROD-6888:1-C
Contract DAHC04-67-C-0013

Descriptors: (*Styrenes, Optical properties), (*Polymers, Optical properties), Solutions, Molecular weight, Statistical distributions, Light, Scattering, Organic solvents.

A brief summary is given of the results of optical studies of polystyrene solutions in solvent mixtures.
AD-658 690 HC$3.00 MF$0.65

ISOTHERMAL DEGRADATION OF UNTREATED AND FIRE RETARDANT TREATED CELLULOSE AT 350C,
Naval Radiological Defense Lab San Francisco Calif
A. E. Lipska. 23 Feb 67, 27p Rept no. USNRDL-TR-67-89

Descriptors: (*Cellulose, Pyrolysis), (*Fire resistant materials, Cellulose), Heat of activation, Reaction kinetics, Polysaccharides, Flammability, Fire safety, Ammonium compounds, Phosphates.

Untreated and 2% (NH4)H2PO4 treated alpha cellulose samples were isothermally pyrolyzed in a fluidized bath in a nitrogen environment at 350C. The overall degradation pattern for the untreated samples seems to be similar to that which was observed between 275-300C. The active pyrolysis of the retardant treated cellulose was completed in less than 1.0 minute, leaving a residual weight of 34%; whereas the active pyrolysis of the untreated samples was completed in 10 minutes, yielding a residual weight of 16%. A detailed examination of the initial period of the rapid volatilization and decomposition of the untreated samples at 288C, indicated that the rate of volatilization and decomposition was at least four times as great as that portrayed by the region in which these parameters followed a zero-order rate. (Author)
AD-658 717 HC$3.00 MF$0.65

INFRARED AND GAS CHROMATOGRAPHIC STUDIES OF MAGNET-WIRE ENAMELS.
Naval Ship Research and Development Center Annapolis Md Annapolis Div
For primary bibliographic entry see Field 11C.
AD-658 724 HC$3.00 MF$0.65

SCATTERING OF HIGH-VELOCITY NEUTRAL PARTICLES. XV. He-H2.
Technical rept.,
Massachusetts Inst of Tech Cambridge Dept of Chemistry
I. Amdur, and Allan Laslett Smith. 1967, 14p
Rept no. TR-17
Contract N00014-67-A-0204-004
See also AD-639 680.
Availability: Published in Journal of Chemical Physics.

Descriptors: (*Molecular beams, Scattering), (*Helium, Scattering), (*Hydrogen, Scattering), (*Deuterium, Scattering), Atoms, Molecules, Interactions, Probability, Potential scattering, Perturbation theory.

Total collision cross sections were measured for helium atoms with energies between 500 and 1900 eV scattered by room temperature H2 and D2. Within the experimental precision of plus or minus 2% the cross sections of the two systems are identical. The results were analyzed to obtain the following average potentials: He-H2:V (r) = 12.11 (r exp. -6.07) eV, 1.44A<r<1.76A; He-D2:V (r) = 12.27 (r exp. -6.06) eV, 1.45A<r<1.79A. The measurements are in good agreement with a calculated He-H2 interaction of Krauss and Mies, suitably averaged over molecular orientation. The effect upon scattering of the anisotropy of the potential is discussed in the light of a classical perturbation theory of small-angle scattering developed by Cross. (Author)
AD-658 758 Not available from CFSTI.

ALMOST 'HEAD-ON' COLLISIONS IN THE SCATTERING OF FAST ARGON ATOMS BY HYDROGEN ISOTOPES.
Technical rept.,
Massachusetts Inst of Tech Cambridge Dept of Chemistry
J. E. Jordan, and I. Amdur. 13 Mar 67, 3p Rept no. TR-16
Contract Nonr-1841 (23)
Prepared in cooperation with National Bureau of Standards, Washington, D. C.
Availability: Published in Journal of Chemical Physics v46 n10 p4145-6 May 15 1967.

Descriptors: (*Molecular beams, Scattering), (*Argon, *Elastic scattering), (*Hydrogen, Scattering), (*Deuterium, Scattering), Atoms, Molecules, Interactions, Probability, Potential scattering.

Elastic-scattering cross sections were obtained from the axial attenuation of argon beams. with energies between 400 and 2000 eV, by H2 and D2 at room temperature. The results show a substantial decrease in the cross section when H2, rather than D2, is the scattering gas. The effects which could be responsible for the observed decrease, is a substantial increase in the number of almost 'head-on' collisions in which argon atoms still strike the detector.
AD-658 759 Not available from CFSTI.

THE VAPORIZATION OF ZINC PHOSPHIDE,
Oberlin Coll Ohio Dept of Chemistry
Richard C. Schoonmaker, A. R. Venkitaraman, and P. K. Lee. 10 Feb 67, 9p
AROD-3952:7
Grant DA-ARO (D)-31-124-G397
Availability: Published in Journal of Physical Chemistry v71 n8 p2676-83 1967.

Descriptors: (*Semiconductors, *Sublimation), (*Zinc compounds, Vaporization), (*Phosphides, Vaporization), Mass spectroscopy, Vapor pressure, Phase studies, Heat of formation, Ionization potentials, Thermochemistry, Reaction kinetics.
Identifiers: Zinc phosphide.

The sublimation of Zn3P2 (c) was investigated by torsion effusion, torsion surface vaporization, and mass spectrometric techniques. Vaporization occurs by a congruent decomposition to Zn (g), P4 (g), and P2 (g) in the temperature range 620-820K. The total pressure in effusion cells exhibits a strong dependence upon orifice dimensions and the gross vaporization coefficient varies from 0.024-2 at 620K to 0.068-2 at 820K. Equations are given for the temperature dependences of the total pressure of vapor in equilibrium with Zn3P2 (c) and for the equilibrium constant for the reaction Zn3P2 (c) = 3Zn (g) + 1/2P4 (g). The standard heat of formation for Zn3P2 (c) at 298K from red phosphorus and crystalline zinc is -39.5 plus or minus 5 kcal/mole. The measured ratio of cross sections for ionization of Zn (g) and P4 (g) by 70-ev electrons is sigma (Zn)/sigma (P4) = 0.49. Other thermodynamic and kinetic data are presented and discussed for the vaporization process. (Author)
AD-658 763 Not available from CFSTI.

RECENT ADVANCES IN AEROTHERMOCHEMISTRY, VOLUME I.
Conference proceedings,
Advisory Group for Aerospace Research and Development Paris (France)
I. Glassman. 1967, 446p Rept no. AGARD-CP-12-Vol-I
NATO Furnished. See also Volume 2, AD-658 782.

Descriptors: (*Gas flow, *Thermochemistry), (*Molecular beams, Thermochemistry), Symposia, Reaction kinetics, Dissociation, Relaxation time, Molecular energy levels, Hydrochloric acid, Molecular energy levels, Excitation, Shock waves, Potential scattering, Electron transitions, Interactions, Argon, Potassium, Helium.

Contents: Microscopic and macroscopic approach to chemical rate processes; Unimolecular thermal dissociation of small molecules; The relaxation and dissociation of small molecules; Effects of certain energy transfer processes on population distributions in expanding gas flows; Application de la methode de renversement des raies d du sodium a la mesure des temperatures de vibration de l'azote derriere un choc en propagation et apres detente dans une tuyere; A shock tube study of the infrared emission from HCl: vibrational relaxation times for the upper states; The role of vibrational excitation in atom switching reactions; Shock reflection and surface effects in the shock tube; Modulated atomic beams and their uses; Thermal energy molecular beam measurements of atom-atom

differential scattering cross sections; Thermal energy molecular beam measurements of inelastic cross sections for rotational quantum transitions; Performance of an arc-heated supersonic molecular beam and its application to molecule-molecule collision studies; Supersonic nozzle beams - some recent experimental results; Chemical reaction cross-sections determined by molecular beams in the 10 eV energy range; The production of a 2 eV pulsed argon beam using a shock tube source; Total cross-section measurements for K on He in the energy range of 0.35 to 16.5 eV; On the design of experiments with a shock-tube-driven molecular beam.
AD-658 781 HC$3.00 MF$0.65

RECENT ADVANCES IN AEROTHERMOCHEMISTRY, VOLUME II.
Conference proceedings,
Advisory Group for Aerospace Research and Development Paris (France)
I. Glassman. 1967, 401p Rept no. AGARD-CP-12
NATO Furnished. See also Volume 1, AD-658 781.

Descriptors: (*Gas flow, *Thermochemistry), (*Plasma medium, Thermochemistry), Symposia, Nonequilibrium flow, One-dimensional flow, Argon, Gas ionization, Nozzle gas flow, Exhaust gases, Discharge tubes, Wake.

Contents: Recent studies of non-equilibrium flows at the Cornell Aeronautical Laboratory; Steady one-dimensional flow of a gas with relaxation; Spectrum-line-reversal temperature measurements through unsteady rarefaction waves in vibrationally relaxing gases; Interferometric measurement of non-equilibrium flow fields around cones and comparison with characteristics calculations; Mass spectrometric studies of impurity ionization in shock-heated argon; Non-equilibrium nozzle flow with condensation; Discussion de la stabilite des solutions intervenant dans l'analyse des ecoulements relaxes; Comparative evaluation of several approximate methods of analysis of non-equilibrium nozzle flows; Applicability of sudden-freezing criteria in analysis of chemically complex rocket nozzle expansions; Measurements of relaxation effects in nozzle flow of hot combustion gases by means of shock-tube technique II; Unsteady, diffusing, reacting, tubular flow with application to the flow in a glow discharge tube; Experimental and analytical consideration of turbulent heterogenous mixing in the wake.
AD-658 782 HC$3.00 MF$0.65

X-RAY DIFFRACTION STUDY OF ORDERING IN TWO SIGMA PHASES,
Illinois Univ Urbana
For primary bibliographic entry see Field 11F.
AD-658 794 Not available from CFSTI.

COAGULATION AND REVERSAL OF CHARGE OF LYOPHOBIC COLLOIDS BY HYDROLYZED METAL IONS. IV. CHROMIUM (III) NITRATE AND PERCHLORATE,
Clarkson Coll of Technology Potsdam N Y
Stanka Kratohvil, and Egon Matijevic. 7 Jan 67, 11p
AROD-2613:21
Grant DA-ARO (D)-31-124-G656
See also AD-644 825.
Availability: Published in Journal of Colloid and Interface Science v24 n1 p47-55 May 1967.

Descriptors: (*Colloids, *Coagulation), (*Chromium compounds, Colloids), Nitrates, Perchlorates, Silver compounds, Bromides, Electrostatics, Aging (Materials), Stabilization, Hydrolysis, Polymerization.
Identifiers: Chromic nitrate, Chromic perchlorate, Silver bromide.

The coagulation and the reversal of charge of silver bromide sols by freshly prepared and aged solutions of chromium (III) nitrate and chromium (III) perchlorate was investigated. The aging was accomplished either by storing the chromium salt solutions at room temperature or by heating these at 90C for various periods of time. The 'log. concentration chromium salt vs. pH' domains of coagulation and of stabilization due to the reversal of charge have been determined. The results are discussed in light of the existing information on the hydrolysis and polymerization of chromium (III) ion. (Author)
AD-658 799 Not available from CFSTI.

MEASUREMENT OF RELAXATION TIMES OF CONCENTRATION FLUCTUATIONS BY THE ELECTRIC FIELD ON CRITICAL OPALESCENCE,
Cornell Univ Ithaca N Y Dept of Chemistry
C. C. Gravatt. 3 Apr 67, 5p
AFOSR-67-2179
Grant AF-AFOSR-750-65
Availability: Published in Physical Review Letters v18 n22 p948-50 May 1967.

Descriptors: (*Solutions, *Optical phenomena), Light, Scattering, Relaxation time, Thermal properties, Electric fields.
Identifiers: Critical opalescence.

Measurements of the electric field effect on the critical opalescence were extended to a study of the phenomena in the scattered light. Relaxation times were obtained which when integrated over all scattering angles can be related to the relaxation times previously reported from transmitted light measurements. The scattered light relaxation times follow the 'Fixman modification' of the Debye theory of relaxation times of concentration fluctuations. The critical exponent gamma was estimated to be 1.2. Results are presented for the angular range 30 to 135 deg. and for the temperature range above the critical temperature of 0.6C to 0.01C. (Author)
AD-658 801 Not available from CFSTI.

POLE-FIGURE INVERSION FOR THE TRICLINIC CRYSTAL CLASS. POLYETHYLENE TEREPHTHALATE,
Duke Univ Durham N C Dept of Chemistry
For primary bibliographic entry see Field 20B.
AD-658 802 Not available from CFSTI.

DISSOCIATIVE IONIZATION OF H2 AND D2.
Revised ed.,
Joint Inst for Lab Astrophysics Boulder Colo
L. J. Kieffer, and Gordon H. Dunn. 14 Feb 67, 7p
AROD-4445:87
Contract DA-31-124-ARO (D)-139, ARPA Order-0492
Revision of manuscript submitted 29 Dec 66.
Availability: Published in Physical Review v158 n1 p61-5 Jun 5 1967.

Descriptors: (*Hydrogen, *Gas ionization), (*Deuterium, Gas ionization), Dissociation, Ions, Atomic energy levels, Distribution, Line spectrum, Intensity.
Identifiers: Defender project, Franck-Condon principle.

Energy distributions of H (+) (D (+)) from dissociative ionization of H2 (D2) are reported. Evidence of the 2p sigma-u state's being the major source of energetic ions is cited. Calculated and measured energy distributions do not agree well. Possible explanations are suggested. (Author)
AD-658 804 Not available from CFSTI.

TOWARD A CHARGE-DENSITY ANALYSIS OF THE CHEMICAL BOND; THE CHARGE-DENSITY BOND MODEL,
Chicago Univ Ill Lab of Molecular Structure and Spectra
Bernard J. Ransil, and John J. Sinai. 17 Mar 66, 29p
AROD-3835:30
Contract DA-11-022-ORD-3119, Grant NSF-GP-3427
Availability: Published in Journal of Chemical Physics v46 n10 p4050-74 May 15 1967.

Descriptors: (*Chemical bonds, Theory), (*Molecular orbitals, Density), Electrons, Probability, Diagrams, Ground state, Wave functions, Lithium, Nitrogen, Fluorine, Hydrogen compounds, Fluorides, Lithium fluorides.

Total-charge-density diagrams (RHO diagrams) are presented for the ground states of Li2, N2, F2, HF, and LiF in BMMO (best minimal molecular-orbital) and accurate SCF (self-consistent-field) approximations. On the basis of contour geometry the RHO diagrams are partitioned into regions of localized and delocalized charge density for which approximate average electron populations, called Pl and Pd, respectively, are computed. A positive correlation between the binding energy De and the ratio Pd/Pl is noted. An alternate approach to interpreting the p diagram is introduced, in which charge-density-difference diagrams (Delta-RHO diagrams) are interpreted as bond maps, i.e., diagrams which define regions of localized charge distributions on the corresponding RHO maps. Binding or antibinding character is then determined for each region of the total-density map using Berlin's forces-on-nuclei criteria. Corresponding electron populations for these regions may be computed by integrating the total-density over the regional limits defined by the zero contours. A linear relationship between De and the ratios of these populations is noted. The Delta RHO maps display distinctly different contour patterns for homonuclear and heteronuclear molecules, which characteristic provides a means of differentiating and classifying binding mechanisms in terms of charge-density sharing and charge-density transfer, compatible with conventional bonding concepts. The possible sources of error in calculation and interpretation of the Delta RHO maps are enumerated and briefly discussed.
AD-658 812 Not available from CFSTI.

THERMOCHEMICAL RELATIONS FOR WATER AT HIGH TEMPERATURES AND PRESSURES,
Rand Corp Santa Monica Calif
R. A. Papetti, and M. C. Fujisaki. Aug 67, 55p
Rept no. RM-4969-PR
Contract F44620-67-C-0045

Descriptors: (*Water, *Thermochemistry), (*Nuclear explosions, Underwater explosions), High-pressure research, High-temperature research, Thermodynamics, Equations of state, Energy, Entropy, Free energy, Potential energy.

A compilation is given of the equations and data necessary to determine the equations of state and equilibrium composition of a dense mixture of chemically reacting gases. Emphasis is on the thermodynamic regions that could be attained by this mixture upon subjecting water to a nuclear burst. At present, there are no adequate experimental data to explain the thermodynamic equilibrium properties of water at very high pressure and temperature, and no reliable methods exist to determine the correct functional forms for mixtures of polar and nonpolar molecules, ions, and free radicals at close separations and high temperatures. Using the approach of chemical thermodynamics, the study presents methods for determining the pressure, internal energy, entropy, Helmholz free energy, chemical potential, and composition as functions of the temperature and volume of the gas mixture. These should be regarded as interpolation procedures that smoothly join results in other regions that are covered by experimental data or adequate physical theories. (Author)
AD-658 821 HC$3.00 MF$0.65

Group 7D — Physical chemistry

MERGED LAYER IONIZATION IN THE STAGNATION REGION OF A BLUNT BODY.
Aerospace Corp San Bernardino Calif San Bernardino Operations
For primary bibliographic entry see Field 20D.
AD-658 859 HC$3.00 MF$0.65

NMR STUDIES OF INTRA- AND INTERMOLECULAR INTERACTIONS.
Final rept. 1 Jan 65-31 Aug 67,
Colorado Univ Boulder
Melvin W. Hanna. 31 Aug 67, 10p
AFOSR-67-2180
Grant AF-AFOSR-216-65

Descriptors: (*Nuclear magnetic resonance, Interactions), (*Molecular association, Nuclear magnetic resonance), (*Complex compounds, Nuclear magnetic resonance), Chemical reactions, Chemical bonds, Molecular structure, Molecular orbitals.
Identifiers: Charge transfer complexes.

A brief summary is given of work involving the relative strengths of hydrogen bonds, the structure of charge transfer complexes and the properties of metal olefin complexes. Nuclear magnetic resonance spectroscopy (NMR) was the principal experimental tool that was used.
AD-658 861 HC$3.00 MF$0.65

PARAMAGNETIC IONS AND LATTICE VIBRATIONS.
Johns Hopkins Univ Baltimore Md
For primary bibliographic entry see Field 20L.
AD-658 895 HC$3.00 MF$0.65

A STUDY OF THE ELECTRIC DEFLECTION OF MOLECULAR BEAMS.
Midwest Research Inst Kansas City Mo
For primary bibliographic entry see Field 14B.
AD-658 903 HC$3.00 MF$0.65

FIRST-ORDER LOCALIZED-ELECTRON = COLLECTIVE-ELECTRON TRANSITION IN LaCoO.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20L.
AD-658 906 Not available from CFSTI.

HARTREE-FOCK THEORY: SLATER DETERMINANTS OF MINIMUM ENERGY.
Journal article,
Massachusetts Inst of Tech Lexington Lincoln Lab
Thomas A. Kaplan, and Walter H. Kleiner. 1 Aug 66, 12p Rept no. JA-2873
ESD-TR-67-338
Contract AF 19 (628)-5167
Availability: Published in The Physical Review v156 n1 p1-11 Apr 5 1967.

Descriptors: (*Atomic orbitals, *Hartree-Fock approximation), Ions, Wave functions, Stability, Electrons, Spin, Atomic energy levels, Hydrogen, Lithium, Boron, Nitrogen, Oxygen, Sodium, Phosphorus.

A theorem is proved (on the basis of physically reasonable assumptions) to the effect that in Hartree-Fock (HF) theory an electron can always be added to an N-electron system without raising its energy. The theorem is applied to show that the conventional HF wave function is unstable for certain negative atomic ions (h (-), Li (-), B (-), N (-), N (--), O (-), O (--), Na (-), P (-)), and that the typical extent of the instability is chemically significant. A consequence of the instability is that the lowest level in HF theory does not have the symmetry of the exact ground level. This is the case, in particular, for the closed-shell ions H (-), Li (-), O (--), and Na (-)--a result contrary to some earlier expectations. The two-electron one-center system with fixed nuclear charge Ze (Z not restricted to integer values) is investigated in detail on the basis of a simplified model defined by specifying restrictions which the allowable determinantal wave functions must satisfy. As Z decreases, the model shows explicitly the onset of the instability described above. It further shows that for Z>1, any true minimum-energy determinant Dg is bound (although the interesting question of whether Dg is bound for Z < or = 1, apparently raised here for the first time, remains unanswered). A precise analogy between the electron problem and certain spin problems is defined. This analogy sheds light on the HF approximation. (Author)
AD-658 907 Not available from CFSTI.

THE a (3)X10 (-) TO X (1)SIGMA (+) TRANSITION OF THE GaH MOLECULE,
Vanderbilt Univ Nashville Tenn Dept of Chemistry
P. C. Poynor, K. K. Innes, and M. L. Ginter. 3 Apr 67, 7p
AROD-4283:11
Contract DA-31-124-ARO (D)-317, ARPA Order-40
Prepared in cooperation with Maryland Univ., College Park. Inst. for Molecular Physics.
Availability: Published in Journal of Molecular Spectroscopy v23 n2 p237-41 Jun 1967.

Descriptors: (*Gallium compounds, *Electron transitions), (*Hydrides, Electron transitions), Band spectrum, Molecular spectroscopy, Selection rules, Tables.
Identifiers: Gallium hydride.

Recently it proved possible to identify and analyze the doubly-forbidden a (3)Xi0 (-) (0-) to X (1)Sigma (+) (0 (+)) transition for the InH molecule. The present work describes the results of the analysis of the (0-0), (1-1), (1-0), (2-1), and (2-2) bands for the analogous subsystem of the GaH molecule, using data from new measurements of photographic plates made during an earlier study. Each vibrational band consists of single, weak Q (J)-branch, while none of the bands, with the exception of the (0-0) band, is sufficiently intense for the positive assignment of branch lines corresponding to J values less than nine. (Author)
AD-658 908 Not available from CFSTI.

NEW PHASE TRANSFORMATION IN InSb AT HIGH PRESSURE AND HIGH TEMPERATURE,
Massachusetts Inst of Tech Lexington Lincoln Lab
Mario D. Banus, and Mary C. Lavine. 13 Oct 66, 6p Rept no. JA-2891
ESD-TR-67-486
Contract AF 19 (628)-5167
Availability: Published in Journal of Applied Physics v38 n5 p2042-6 Apr 1967.

Descriptors: (*Indium antimonides, Phase studies), Phase diagrams, Annealing, High-temperature research, Pressure, X-ray diffraction analysis, Superconductivity, Transformations, Transition temperature.

A new phase transformation at high pressure and elevated temperature has been found in the InSb pressure-temperature phase diagram. This transformation to a new phase designated as InSb-III has been established by measurements of superconducting transition temperature (T sub c) as a function of annealing temperature at several pressures and by x-ray determinations on the new phase, both retained at one atmosphere and at high pressure and temperature. The higher T sub c for InSb-III (T sub c = 4.1 degrees plus or minus 0.1 K) and the x-ray results lead to the conclusion that InSb-III is a new phase different from the orthorhombic phase (T sub c = 3.5 K). (Author)
AD-658 915 Not available from CFSTI.

ANALYSIS OF ELASTIC-SCATTERING DATA IN THE SEMICLASSICAL APPROXIMATION,
Brown Univ Providence R I
E. F. Greene, G. P. Reck, and J. L. J. Rosenfeld. 11 Oct 66, 8p
AROD-4676:6
Contract DA-31-124-ARO (D)-163, ARPA Order-0501
Prepared in cooperation with Wayne State Univ., Detroit, Mich., and Thornton Research Centre (Gt. Brit.).
Availability: Published in Journal of Chemical Physics v46 n10 p3693-7 May 15 1967.

Descriptors: (*Molecular beams, Elastic scattering), (*Elastic scattering, Approximation (Mathematics)), Potential scattering, Differential cross section, Special functions (Mathematical).

The usefulness and accuracy of several approximations in the semiclassical derivation of the differential elastic scattering cross section are evaluated for the purpose of defining the best way of analyzing experimental data to obtain potential parameters. (Author)
AD-658 916 Not available from CFSTI.

SCATTERING OF POTASSIUM BY A SERIES OF REACTIVE AND NONREACTIVE COMPOUNDS IN CROSSED MOLECULAR BEAMS,
Brown Univ Providence R I Metcalf Chemical Labs
J. R. Airey, E. F. Greene, G. P. Reck, and J. Ross. 22 Nov 66, 14p
AROD-4676:3
Contract DA-31-124-ARO (D)-163, ARPA Order-0501
Availability: Published in The Journal of Chemical Physics v46 n9 p3295-3305 May 1 1967.

Descriptors: (*Potassium, Molecular beams), (*Molecular beams, Scattering), Interactions, Potential scattering, Alkanes, Benzene, Cyclohexanes, Alkenes, Halogenated hydrocarbons, Carbon tetrachloride, Silicon compounds, Tin compounds, Chlorides, Probability.
Identifiers: Dimethyl butenes, Methyl iodides, Pentanes, Silicon tetrachloride, Stannic chloride.

The scattering of potassium by the nonreactive compounds C (CH3)4, C6H6, C6H12, (CH3)2C=C (CH3)2 and the reactive compounds CH3I, CCl4, SiCl4, SnCl4, SF6 was studied in experiments with crossed molecular beams. In each case the nonreactive scattering of velocity-selected K was measured as a function of laboratory scattering angle at a number of initial relative kinetic energies. Except for K + SnCl4, rainbow scattering is observed. The differences which appear between the measured scattering in this region for the various nonreactive compounds show the influence of the molecular structure on the intermolecular potential. Potential parameters of an assumed spherically symmetric potential (exp-6, alpha = 12) are calculated from the rainbow scattering. The scattering of K from the various reactive compounds differs markedly at larger angles and is an indication of a correspondingly large variation of reaction cross sections. Probabilities of reaction, threshold energies, threshold distances, and the energy dependence of the total reaction cross sections are obtained from an interpretation of the measurements. (Author)
AD-658 918 Not available from CFSTI.

NONREACTIVE SCATTERING OF K BY HBr AND DBr IN CROSSED MOLECULAR BEAMS,
Brown Univ Providence R I Metcalf Chemical Labs
J. R. Airey, E. F. Greene, K. Kodera, G. P. Reck, and J. Ross. 22 Nov 66, 12p
AROD-4676:5
Contract DA-31-124-ARO (D)-163, ARPA Order-0501
Availability: Published in The Journal of Chemical Physics v46 n9 p3287-95 May 1 1967.

Descriptors: (*Potassium, Molecular beams), (*Molecular beams, Scattering), Bromides, Hydrogen compounds, Deuterated compounds, Interactions, Probability, Potential scattering.
Identifiers: Hydrogen bromide.

The nonreactive scattering of K by HBr and DBr was measured in crossed molecular beams as a function of relative kinetic energy and for two configurations of the beams and the detector. The effect of averaging over residual energy distributions in the two beam and detector configurations is studied. It is shown that the density of the cross beam must be kept low because attenuations of 50% of the K beam by the cross beam affect the observed rainbow cross section appreciably. From the rainbow scattering and a kinematic restriction, the parameters for an assumed exp-6 potential (alpha =12) are found to be K+HBr: epsilon=0.565 kcal/mole, rm=4.2A; K+DBr: epsilon =0.564 kcal/mole, rm=3.9A. Chemical reaction affects the nonreactive scattering at large scattering angles. Probabilities of reaction, threshold energies, and total reaction cross sections are obtained from the nonreactive scattering with a simple model used previously. The total reaction cross sections are: K+HBr: 35.0 plus or minus 9.0 sq. A, K+DBr: 26.0 plus or minus 8.0 sq. A in the energy range 2.6 to 5.8 kcal/mole. (Author)
AD-658 920 Not available from CFSTI.

KINETIC STUDIES OF THE REACTIONS OF ANIONS WITH DIFLUORAMINE,
Hercules Research Center Wilmington Del
W. T. Yap, A. D. Craig, and G. A. Ward. 3 Feb 67, 9p
AROD-4136:24
Contract DA-31-124-ARO (D)-62, ARPA Order-402
Availability: Published in Journal of the American Chemical Society v89 n14 p3442-6 Jul 5 1967.

Descriptors: (*Fluoroamines, Reaction kinetics), (*Oxidizers, Fluoroamines), Polarographic analysis, Hydroxides, Sulfates, Cyanides, Iodides, Thiocyanates, Azides, Bromides, Chlorides, Phosphates, Acetates, Chemical reactions.
Identifiers: Fluorimide.

The kinetics of the reactions of difluoramine with a variety of anions in aqueous solution were studied. The experimental method employed was to measure the concentration of HNF2 in solution as a function of time by polarographic analysis. The concentration of anion was varied from 0.001 to 1.0 M, usually under pseudo-first-order conditions. In general, the reactions are first order in difluoramine and first order in the anion. The second-order rate constants for the reactions decrease in the order OH (-)>HSO3 (-)>CN (-)>I (-)>SCN (-)>N3 (-)>Br (-)>Cl (-)>H2PO4 (-)>OAc (-). Precise values of each rate constant were obtained for most of the ions, and analyses of the reaction products for each ion were made. With the exception of hydroxyl ion, this order of rankings of the ions corresponds to that of their expected nucleophilicities. This order is consistent with a mechanism which involves direct attack of the anion on HNF2. The gross deviation of the behavior of hydroxyl ion from that of the other anions indicates that hydroxyl ion reacts with difluoramine by a mechanism different from that of the other anions. (Author)
AD-658 921 Not available from CFSTI.

PRESSURE EFFECTS ON THE ELECTRICAL PROPERTIES OF POLYCRYSTALLINE BORON,
Revised ed.,
Denver General Hospital Colo
Terrell N. Anderson, Onnig H. Bezirjian, and Henry Eyring. 6 Mar 67, 8p
AROD-2759:18
Grant DA-ARO (D)-31-124-G618
Revision of manuscript submitted 6 Mar 67.
Availability: Published in Journal of the Electrochemical Society v114 n8 p805-9 Aug 1967.

Descriptors: (*Boron, Electrical properties), Electrochemistry, Resistance (Electrical), Seebeck effect, Electrical conductance, Pressure, Band theory of solids.

The electrical resistances of beta-rhombohedral and tetragonal polycrystalline boron were measured at temperatures from 25 to 300C and pressures from 1 atm to 60 kb (kilobars); the thermoelectric power was measured to 13 kb. Pressures were applied with an anvil press. With increasing temperature the resistance, R, continually decreased and the thermoelectric power, Q, at first increased and then levelled off. The shapes of the log R vs. 1/T and Q vs. T curves are explained by intrinsic conduction at high temperatures going to extrinsic conduction at the lowest temperatures studied. In the intrinsic region an increase in pressure causes a reduction in the resistance, energy gap, and thermoelectric power of boron. For the low-temperature extrinsic region pressure lowers the resistance and hardly affects the thermoelectric power. These effects are discussed. (Author)
AD-658 929 Not available from CFSTI.

PREPARATION AND CHARACTERIZATION OF SOME CELLULOSE GRAFT COPOLYMERS. PART IV. SOME PROPERTIES OF ISOLATED CELLULOSE ACETATE-STYRENE GRAFT COPOLYMERS,
Research Triangle Inst Durham N C
For primary bibliographic entry see Field 11I.
AD-658 933 Not available from CFSTI.

MEASUREMENTS OF DISSOCIATIVE RECOMBINATION OF CO2 (+) IONS WITH ELECTRONS.
Pittsburgh Univ Pa Dept of Physics
For primary bibliographic entry see Field 3B.
AD-658 934 Not available from CFSTI.

MEASUREMENTS OF STARK PROFILES OF C II AND Ca II LINES,
National Bureau of Standards Washington D C
For primary bibliographic entry see Field 20I.
AD-658 941 Not available from CFSTI.

CORED CATHODE FOR STABILIZATION OF THE dc ARC,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 14B.
AD-658 950 Not available from CFSTI.

SPECTRUM OF Sm III,
Johns Hopkins Univ Baltimore Md
Andre Dupont. 3 Feb 67, 5p
AFOSR-67-2199
Contract AF 49 (638)-1497
Availability: Published in Journal of the Optical Society of America v57 n7 p867-9 Jul 1967.

Descriptors: (*Samarium, *Atomic spectroscopy), Atomic energy levels, Emissivity, Line spectrum, Ions.

Approximately 15,000 lines of the emission spectrum of doubly ionized samarium were photographed between 1800A and 9500A under varied conditions of arc and spark discharge and with electrodeless lamps. The (7)F ground multiplet of 4f (6) and 36 septet levels of 4f (5)5d were found. (Author)
AD-658 954 Not available from CFSTI.

ELECTRIC FIELD EFFECT ON THE CRITICAL OPALESCENCE. II. RELAXATION TIMES OF CONCENTRATION FLUCTUATIONS,
Cornell Univ Ithaca N Y Dept of Chemistry
P. Debye, C. C. Gravatt, and M. Ieda. 18 Nov 66, 7p
AFOSR-67-2182
Grant AF-AFOSR-750-65
Presented in part at the Fall 1966 Meeting of the American Chemical Society. See also AD-604 494, AD-642 606.
Availability: Published in Journal of Chemical Physics v46 n6 p2352-6 Mar 15 1967.

Descriptors: (*Solutions, *Optical phenomena), (*Electric fields, Solutions), Concentration (Chemistry), Mixtures, Relaxation time, Nitrobenzenes, Alkanes, Electromagnetic pulses, Light, Scattering.
Identifiers: Critical opalescence, Trimethyl pentanes.

In an investigation of the effect of electric fields on the critical opalescence, time-dependent phenomena were observed which are related to theoretical relaxation times of concentration fluctuations for a binary mixture. Rectangular dc pulses of 25 to 60 kV/cm and 10-200-microsec duration were applied to a critical mixture nitrobenzene and 2,2,4-trimethylpentane at a series of temperatures above the critical solution temperature. Relaxation times associated with the change in the transmitted light intensity were found to be independent of the pulse width and the field strength. The relaxation times are proportional to (T-Tc) to the -0.9 power and have magnitudes comparable with relaxation times determined from the frequency broadening of light scattered from similar binary systems. It has also been possible to extend the agreement between the Debye theory of the electric field effect on critical opalescence and the experimental results to within 0.1C of the critical temperature. (Author)
AD-658 959 Not available from CFSTI.

THE PREPARATION AND PROPERTIES OF WELL-DEFINED GRAFT COPOLYMERS.
Research Triangle Inst Durham N C Camille Dreyfus Lab
For primary bibliographic entry see Field 11I.
AD-658 994 Not available from CFSTI.

SPECTRUM OF Ho III,
Johns Hopkins Univ Baltimore Md
J. H. McElaney. 3 Feb 67, 5p
AFOSR-67-2202
Contract AF 49 (638)-1497
Availability: Published in Journal of the Optical Society of America v57 n7 p870-2 Jul 1967.

Descriptors: (*Holmium, *Atomic spectroscopy), Intensity, Microphotometers, Energy, Ionization, Measurement, Tables.

The emission spectrum of doubly ionized holmium was photographed and measured over the region 1900 A -- 11,000 A. A partial analysis of this spectrum was undertaken which resulted in the determination of 42 energy levels of the 4f (11), 4f (10)5d, 4f (10)6s, and 4f (10)6p configurations. (Author)
AD-659 000 Not available from CFSTI.

TECHNIQUE FOR MEASURING THE HALL EFFECT IN HIGH RESISTIVITY THIN FILMS.
Naval Avionics Facility Indianapolis Ind
For primary bibliographic entry see Field 20C.
AD-659 024 HC$3.00 MF$0.65

GOLD-CHLORINE AND GOLD-BROMINE EQUILIBRIA IN MOLTEN ALKALI HALIDES.
Research and development rept.,
Naval Ship Research and Development Center Annapolis Md Annapolis Div
David E. Icenhower. Sep 67, 102p
NSRDC-2442

Descriptors: (*Gold, Chemical equilibrium), (*Controlled atmospheres, Purification), Halogenated hydrocarbons, Chlorine, Bromine, Salts, Potassium compounds, Silver compounds, Chlorides, Sodium chloride, Vapor pressure, Submarines, Life support.

The reaction of Gold with chlorine or bromine in molten alkali halides was studied over a range of temperatures and halogen partial pressures. Equilibrium concentration of Au (I) and Au (III) were determined by chemical analysis of samples taken at temperatures of 350 to 1050C. The equilibrium constants decreased with increasing temperature. This system is considered for use in removing chlorine and bromine from halogenated hydrocarbons in the atmosphere of a submarine since gold has a much higher affinity for chlorine at 100C than at 500C. The lowest practical temperature of operation is 350C due to freezing of the salt mixture. At this temperature pure silver wool would be much more effective in removing the chlorine and bromine but could not be regenerated in place. (Author)
AD-659 032 HC$3.00 MF$0.65

RESEARCH IN THE FIELD OF HIGH RESOLUTION INFRARED SPECTROSCOPY.
Pennsylvania State Univ University Park Osmond Lab
For primary bibliographic entry see Field 20F.
AD-659 042 Not available from CFSTI.

A REACTION VESSEL FOR USE IN GAS CHROMATOGRAPHIC ANALYSIS OF AQUEOUS SOLUTIONS. APPLICATION FOR BLOOD CARBON MONOXIDE DETERMINATION.
Naval Medical Research Inst Bethesda Md
For primary bibliographic entry see Field 6L.
AD-659 061 HC$3.00 MF$0.65

TENSILE STRENGTH OF RUBBERS.
Princeton Univ N J Frick Chemical Lab
For primary bibliographic entry see Field 11J.
AD-659 065 HC$3.00 MF$0.65

REVERSIBLE OXYGEN ELECTRODES.
Pennsylvania Univ., Philadelphia Electro-Chemistry Lab.
For primary bibliographic entry see Field 10B.
AD-803 439 HC$3.00 MF$0.65

REVERSIBLE OXYGEN ELECTRODES.
Pennsylvania Univ., Pa. Electro-Chemistry Lab.
For primary bibliographic entry see Field 10B.
AD-810 816 HC$3.00 MF$0.65

REVERSIBLE OXYGEN ELECTRODES.
Pennsylvania Univ., Philadelphia. Electro-Chemistry Lab.
For primary bibliographic entry see Field 10B.
AD-814 722 HC$3.00 MF$0.65

BIBLIOGRAPHY OF LIESEGANG RINGS (2d. Ed.).
National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
1 Sep 67, 67p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402 $0.40.

Descriptors: (*Gels, Chemical precipitation), (*Chemical precipitation, *Rings), Diffusion, Colloids, Bibliographies.
Identifiers: Liesegang rings.

A bibliography of Liesegang rings (periodic precipitation figures produced by diffusion) and other periodic structures for the period 1855-1965 is compiled in chronological and alphabetical order. An author index and an index to applications of Liesegang rings to extra-chemicals are also given. (Author)
NBS-Misc Pub-292 HC$0.40 MF$0.65

STANDARD X-RAY DIFFRACTION POWDER PATTERNS,
National Bureau of Standards, Washington, D. C.
H. E. Swanson, H. F. McMurdie, M. C. Morris, and E. H. Evans. 31 Aug 67, 94p
Hard Copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.55.

Descriptors: (*X-ray diffraction analysis, Standards), (*Crystal structure, *Crystallography), X-ray diffraction cameras, Intensity, Crystal lattices, Measurement, Identification, Indexes.

Standard x-ray diffraction powder patterns are presented for 80 substances. Thirty-nine of these patterns represent experimental data and 41 are calculated. The experimental x-ray powder diffraction patterns are made with a Geiger counter x-ray diffractometer, using samples of high purity. All d-values were assigned Miller indices determined by comparison with theoretical interplanar spacings and from consideration of space group extinctions. The densities and lattice constants were calculated, and the refractive indices were measured whenever possible. The calculated x-ray powder diffraction patterns were obtained from published crystal structure data. The reported peak height intensities for calculated patterns were converted from integrated intensities. Reference intensity values based upon the strongest line of corundum (113) in a 50 percent weight mixture are given for 73 materials. (Author)
NBS-Mono-25-Section-5 HC$0.55 MF$0.65

REACTION RATES OF CARBON MONOXIDE WITH HYDROXYL RADICALS AND OXYGEN ATOMS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
F. E. Belles, A. E. Potter, Jr., and E. L. Wong. Sep 67, 20p NASA-TN-D-4162
Contract 129-01-03-01-22

Descriptors: *Carbon monoxide, *Chemical reaction, *Mass spectrometry, *Oxygen atom, Activation, Atom, Carbon, Chemistry, Constant, Determination, Energy, Hydroxyl, Mass, Monoxide, Oxygen, Radical, Rate, Reaction, Reactor, Spectrometry, Stirring, Technique.

For abstract, see STAR 05 21.
N67-35735 HC$3.00 MF$0.65

THERMODYNAMIC PROPERTIES OF POTASSIUM TO 2100 DEG K.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 21.
N67-35776 HC$3.00 MF$0.65

SLOW-ELECTRON SCATTERING BY STRONGLY POLAR MOLECULES.
Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.
Y. Itikawa. May 67, 14p ISAS-412, VOL. 32, NO. 5

Descriptors: *Electron scattering, *Perturbation theory, *Scattering cross section, *Wave function, Capture, Cross section, Dipole, Electron, Function, Matrix, Mechanics, Molecule, Perturbation, Polar, Quantum, Scattering, Theory, Wave.

For abstract, see STAR 05 21.
N67-35955 HC$3.00 MF$0.65

QUANTITATIVE INVESTIGATIONS ON STABLE BLUE SOLUTIONS OF SULPHUR IN ORGANIC SOLVENTS.
Quantitative Untersuchungen An Stabilen Blauen Loesungen des Schwefels in Organischen Loesungsmitteln
Technische Hochschule Munchen (West Germany). Fakultaet Fuer Allgemeine Wissenschaften.
S. Benninger. 1967, 65p
in German

Descriptors: *Absorption spectrum, *Organic liquid, *Solvent, *Sulfur, Absorption, Blue, Chemistry, Color, Extinction, Liquid, Measurement, Organic, Peak, Quantity, Solution, Spectrum, Stability, Temperature.

For abstract, see STAR 05 21.
N67-35975 HC$3.00 MF$0.65

ELECTROCHEMICAL REDUCTION OF CHLORINE ON CARBON IN MOLTEN LITHIUM CHLORIDE - POTASSIUM CHLORIDE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
B. S. Del Duca, and A. E. Potter. Sep 67, 20p
NASA-TN-D-4175
Contract 120-34-01-11-22

Descriptors: *Chlorine, *Electrochemistry, *Lithium chloride, *Potassium chloride, *Pyrolytic graphite, Adsorption, Carbon, Chemical, Chloride, Electrolysis, Lithium, Potassium, Pyrolysis, Reduction.

For abstract, see STAR 05 21.
N67-35982 HC$3.00 MF$0.65

A STUDY OF ROTATIONAL RELAXATION IN A LOW- DENSITY HYPERSONIC FREE JET BY MEANS OF IMPACT-PRESSURE MEASUREMENTS.
California Univ., Los Angeles, Dept. of Engineering.
B. Lefkowitz. Jul 67, 62p NASA-CR-88364, REPT.-67-27
Grant NSG-237-62, Contract NSF GK-580

Descriptors: *Free jet, *Impact pressure, *Molecular beam, *Relaxation method, Beam, Collision, Flow, Free, Frequency, Gas, Hypersonic, Impact, Jet, Low density, Measurement, Method, Molecular, Nitrogen, Phase, Pitot tube, Pressure, Relaxation, Rotation, Thesis, Viscosity.

For abstract, see STAR 05 21.
N67-36171 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE HIGH TEMPERATURE CHEMISTRY AND PHYSICS OF GASES AND PLASMAS.
International Union of Pure and Applied Physics, London (England). Commission on High Temperatures and Refractories.
L. Brewer. 31 Mar 67, 14p

Descriptors: *Bibliography, *Chemistry, *Plasma physics, Gas, High temperature, Physics, Plasma, Reaction, Refractory material, Spectroscopy.

For abstract, see STAR 05 21.
N67-36450 HC$3.00 MF$0.65

RESEARCH ON GAS CHROMATOGRAPHIC SYSTEMS TO ANALYZE CERTAIN CHEMICAL CONSTITUENTS OF THE SURFACE OF THE MOON PROGRESS REPORT, 1 JAN. - 30 JUN. 1967.
Yale Univ., New Haven, Conn.
For primary bibliographic entry see Field 7C.
For abstract, see STAR 05 21.
N67-36639 HC$3.00 MF$0.65

URANIUM HEXAFLUORIDE SPECIFICATIONS STUDIES.
Oak Ridge Operations Office (AEC), Tenn.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 19.
ORO-656 HC$3.00 MF$0.65

APPROXIMATIONS FOR THE THERMODYNAMIC AND TRANSPORT PROPERTIES OF HIGH-TEMPERATURE AIR.
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 20M.
PB-175 855 HC$3.00 MF$0.65

ALIGNMENT CHARTS FOR TRANSPORT PROPERTIES VISCOSITY, THERMAL CONDUCTIVITY, AND DIFFUSION COEFFICIENTS FOR NONPOLAR GASES AND GAS MIXTURES AT LOW DENSITY.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Richard S. Brokaw. 27 May 60, 26p NASA-TR-R-81
AD-243 198, N62-70505

Descriptors: (*Gases, Transport properties), (*Transport properties, Nomographs), (*Nomographs, Gases), Kinetic theory, Viscosity, Thermal conductivity, Diffusion, Molecular association, Interactions.

Alignment charts (nomographs) designed to permit rapid calculations of the low-pressure transport properties of nonpolar gases and gas mixtures are presented. Calculations for pure gases are based on the rigorous kinetic theory of gases as applied to a realistic intermolecular force law. Mixture viscosities and conductivities are calculated from good approximations derived from rigorous theory. The properties are calculable with a precision of 2 percent or better. Accuracy depends on how well the constants characterizing the intermolecular force law are known; if constants are derived from experimental data, results should be accurate to 5 percent or better. Force constants are tabulated for 65 gases. (Author)
PB-175 886 HC$3.00 MF$0.65

AN INVESTIGATION OF THE EFFECT OF HIGH TEMPERATURE ON THE SCHUMANN-RUNGE ULTRAVIOLET ABSORPTION CONTINUUM OF OXYGEN.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
John S. Evans, and Charles J. Schexnayder, Jr.
1961, 47p NASA-TR-R-92
N62-70516

Descriptors: (*Oxygen, *Ultraviolet spectroscopy), High-temperature research, Continuous spectrum, Molecular spectroscopy, Wave functions, Shock waves, Molecular energy levels, Electron transitions.

A theoretical and experimental investigation was carried out to determine the absorption coefficient of molecular oxygen at high temperature. The wavelength range was chosen to cover the Schumann-Runge continuum between 1,300 and 1,750 angstrom units. The theoretical investigation covered temperatures from 300 to 10,000K. The experimental investigation was carried out in the range from 4,000 to 10,000K.
PB-175 896 HC$3.00 MF$0.65

PROPERTIES OF PLUTONIUM OXIDE, PART II,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 7B.
For abstract, see NSA 21 19.
RFP-927-Pt-2 HC$3.00 MF$0.65

ANALYTICAL CHEMISTRY SECTION PROGRESS REPORT, JANUARY 1-DECEMBER 31, 1966,
California Univ., Livermore. Lawrence Radiation Lab.
J. E. Harrar. 13 Apr 67, 53p
Contract W-7405-eng-48

Descriptors: (*Chemical analysis, Reports), (*Real time, Computers), Automation, Laboratory equipment, Instrumentation.

For abstract, see NSA 21 19.
UCRL-50006-67-1 HC$3.00 MF$0.65

7E. Radio and Radiation Chemistry

LIFETIME OF FLUORESCENCE FROM THE LOWEST ELECTRONIC STATE IN SULFUR DIOXIDE VAPOR.
Technical rept.,
Rochester Univ N Y Dept of Chemistry
Robert Brent Caton. 1 Oct 67, 110p Rept no. TR-4
Contract Nonr-668 (15)
Doctoral thesis.

Descriptors: (*Sulfur compounds, *Fluorescence), (*Molecular spectroscopy, Sulfur compounds), Dioxides, Vapors, Excitation, Photochemistry, Gas discharges, Emissivity, Molecular energy levels, Relaxation time.
Identifiers: Sulfur dioxide.

The principal accomplishment of the research was the direct experimental measurement of the radiative lifetime of the (3)B1 state of SO2. The value of this quantity is 0.0067 plus or minus 0.001 sec.
AD-658 520 HC$3.00 MF$0.65

FALLOUT SIMULANT DEVELOPMENT: TEMPERATURE EFFECTS ON THE SORPTION REACTIONS OF CESIUM ON FELDSPAR, CLAY, AND QUARTZ,
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 18H.
AD-658 745 HC$3.00 MF$0.65

ENERGETIC POSITIVE IONS FROM PHOTOIONIZATION OF GASES,
Boeing Scientific Research Labs Seattle Wash Geo-Astro Physics Lab
P. H. Doolittle, and R. I. Schoen. Jun 67, 49p Rept no. D1-82-0542

Descriptors: (*Gas ionization, *Photochemistry), (*Nitrogen oxides, Gas ionization), (*Oxygen, Gas ionization), Dissociation, Chemical equilibrium, Ground state, Excitation, Molecular energy levels, Upper atmosphere.

The use of photoionization experiments with ion-retarding potentials is discussed. Preliminary results are presented of measurements obtained with O2 and N2O. If O2 is assumed to dissociate directly, it is estimated that a dissociative state exists which at the equilibrium internuclear separation of the ground state of the neutral molecule lies 20.5 eV above the ground state of the neutral. (Author)
AD-658 788 HC$3.00 MF$0.65

FUNDAMENTAL STUDIES RELATING TO THE RADIATION CHEMISTRY OF SMALL ORGANIC MOLECULES.
Final rept. 15 Aug 62-15 Dec 66,
Johnston (William H) Labs Inc Baltimore Md
Marvin Vestal, and Gerald Lerner. Jan 67, 192p
ARL-67-0114
Contract AF 33 (657)-10846

Descriptors: (*Radiation chemistry, Numerical methods and procedures), (*Computer programs, Radiation chemistry), Organic compounds, Polyatomic molecules, Excitation, Heat of activation, Mass spectrum, Molecular energy levels, Ionization, Propanes, Flow charting.

The report describes methods for performing calculations on the unimolecular reactions of excited polyatomic molecule ions. The theoretical basis for the calculations is presented. The complete FORTRAN program developed for performing these calculations is given together with flow charts and detailed descriptions for the program. The complete input data deck for propane is given and some examples of the results are included. (Author)
AD-658 864 HC$3.00 MF$0.65

MOLECULAR PHOTOCHEMISTRY. V. PHOTOCYCLOADDITION OF ALKYL KETONES TO ELECTRON-DEFICIENT DOUBLE BONDS,
Columbia Univ New York Dept of Chemistry
Nicholas J. Turro, Peter Wriede, J. Christopher Dalton, Donald Arnold, and Anita Glick. 1967, 5p
AFOSR-67-2185
Grant AF-AFOSR-1000-66
Prepared in cooperation with Union Carbide Research Inst., Tarrytown, N. Y. See also AD-654 601.
Availability: Published in Journal of the American Chemical Society v89 n15 p3960-2 Jul 19 1967.

Descriptors: (*Ketones, Photochemistry), (*O-heterocyclic compounds, Synthesis (Chemistry)), Addition reactions, Molecular orbitals, Molecular energy levels, Alkenes, Nitriles.
Identifiers: Cyclobutanones, Trimethylene oxides.

A simple model for the n. pi* state of alkyl ketones was devised and is shown to predict properly the addition of alkyl ketone to electron poor olefins. Several new oxetanes are reported. (Author)
AD-659 015 Not available from CFSTI.

PLUTONIUM ABSTRACTS. VOLUME 7, NUMBER 5,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
BNWL-486-Vol-7-No-5 HC$3.00 MF$0.65

PHOTODESORPTION OF OXYGEN FROM NICKEL OXIDE POWDER.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
P. A. Faeth. Sep 67, 15p NASA-TN-D-4160
Contract 123-33-01-02-22

Descriptors: *Desorption, *Nickel oxide, *Oxygen treatment, *Photodecomposition, Adsorption, Infrared, Kinetics, Light, Logarithm, Luminescence, Nickel, Oxide, Oxygen, Semiconductor, Surface, Treatment.

For abstract, see STAR 05 21.
N67-36420 HC$3.00 MF$0.65

RADIONUCLIDE STANDARDIZATION. A BIBLIOGRAPHY,
National Center for Radiological Health, Rockville, Md.

For primary bibliographic entry see Field 18B.
PB-176 049 HC$3.00 MF$0.65

8. EARTH SCIENCES AND OCEANOGRAPHY

8A. Biological Oceanography

MARINE DINOFLAGELLATE CULTURES FROM RESTING SPORES.

Group 8A—Biological oceanography

Technical rept.,
Woods Hole Oceanographic Institution Mass
D. Wall, R. R. L. Guillard, and B. Dale. 13 Jul 66, 7p Rept no. WHOI-Ref-67-56, WHOI-Contrib-1803
Contracts Nonr-2196 (00), AT (30-1)-1918
Research supported in part by NSF, grants NSF-GB-2881 and NSF-GB-545.
Availability: Published in Phycologia v6 n2/3 p83-6 1967.

Descriptors: (*Marine biology, *Plankton), Spores, Germination, Life cycle, Sea water, Culture media, Cells (Biology).

Incubation of the resting spore (cyst) phase in the life cycle of four species of marine thecate dinoflagellates has provided a new method for establishing unialgal cultures. A simple technique is described for isolating and germinating these resting spores, some of which have a remarkable fossil record. (Author)
AD-658 595 Not available from CFSTI.

MARINE ZOOPLANKTON IN THE WATERS OF SOUTH SAKHALIN AND THE SOUTHERN KURILE ISLANDS.
Naval Oceanographic Office Washington D C
K. A. Brodskii. 1967, 60p Rept no. NOO-Trans-303
TT-67-62922
Zooplankton Morskikh vod Yuzhnogo Sakhalina i Yuzhnykh Kurilskikh Ostrovov, trans. of Issledovaniya Fauny Morei (USSR) n6 p5-46 1959.

Descriptors: (*Plankton, Pacific Ocean), (*Marine biology, Pacific Ocean), Aquatic animals, Data processing systems, Ocean currents, Tables, Ocean bottom sampling, USSR.

Data processing of plankton samples obtained in Far Eastern Seas is discussed and analyzed. A special Kurile-Sakhalin expedition was organized during 1947-1949 with a view to determining the various plankton species and their distribution in the Bering, Okhotsk and Japan Seas, including the adjacent region of the North Pacific Ocean. This study included the investigation of horizontal and vertical water motions, i.e. the upwelling, the warm and cold currents, which affect the distribution of cryoand thermophilic species of plankton. Further, the distribution of fishes feeding on the plankton was studied, because often the schools of fishes help detect the presence, distribution, and quantity of various plankton species in a given area. (Author)
AD-658 730 HC$3.00 MF$0.65

OCEANOGRAPHIC SHIP OPERATING SCHEDULES, FISCAL YEAR 1968.
Interagency Committee on Oceanography Washington D C
For primary bibliographic entry see Field 8J.
AD-658 884 HC$3.00 MF$0.65

8B. Cartography

A TECHNIQUE FOR MACROGEOMETRY TERRAIN ANALYSIS.
Vanderbilt Univ Nashville Tenn Dept of Civil Engineering
For primary bibliographic entry see Field 13B.
AD-658 655 HC$3.00 MF$0.65

TECTONIC STRUCTURE OF THE YAKUTIAN AUTONOMOUS SOVIET SOCIALIST REPUBLIC.
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
For primary bibliographic entry see Field 8G.
AD-658 715 HC$3.00 MF$0.65

8C. Dynamic Oceanography

DIRECTIONAL WAVE SPECTRA MEASUREMENTS OF THE CHESAPEAKE BAY BENEATH THE BAY BRIDGE.
Final rept.,
Stevens Inst of Tech Hoboken N J Davidson Lab
P. H. Rank, G. W. Zepko, and J. A. Mercier. Apr 67, 63p Rept no. 1204
Contract N62269-3560

Descriptors: (*Ocean waves, Instrumentation), Detectors, Surface properties, Electronic equipment, Sensors, Wind, Ocean currents, Measurement, Naval research laboratories, Chesapeake Bay.

A program of experiments was carried out at the Naval Research Laboratories Chesapeake Bay Bridge Laboratory to assess the directional resolving capabilities of a particular array of five wave elevation detectors. It is desired to be able to distinguish waves both by their wave lengths and elevations and by their directions of propagation as part of an NADC sponsored study on surface wave modifications. The collected data were analyzed and rather good success was had in deriving directional wave spectra. Recommendations are made to further improve the experimental procedure. (Author)
AD-658 542 HC$3.00 MF$0.65

OBSERVATIONS OF PARTICLE MOTIONS IN OCEAN WAVES.
Technical memo.,
Naval Underwater Weapons Research and Engineering Station Newport R I
D. H. Shonting. Jul 67, 330p Rept no. NUWS-TM-377-Vol-1

Descriptors: (*Ocean waves, Measurement), (*Particles, Motion), Momentum, Instrumentation, Wind, Energy, Meters, Calibration, Sea water, Data processing systems, Oscillation, Digital computers, Wind tunnels, Tides, Sensors, Oceans, Surface properties, Tables.

Little is known of how wind stress is imparted to the sea surface and how this stress generates both waves and ocean currents. Most wave studies have concentrated upon measuring free surface fluctuations and have avoided the examination of the dynamic regime beneath the free surface of the waves. The work reported herein deals with making direct Eulerian measurements of the complex motions within the wave regime. A historical review and a discussion of the problems of measuring turbulent and oscillatory motions are presented. The development of wave meter instrumentation is discussed. Various calibration techniques were used, including a wind tunnel, and rotating boom and towing tank systems. The methods of data processing, using high speed digital computers, are presented. The study provides evidence that the complex motions at the sea surface can and should be measured. With the relatively crude instrumentation, measurements were obtained which provided meaningful information on the momentum and energy transfer within the sea surface layer. Improvement of instruments and techniques can only result in a better understanding of the energetics of the ocean surface layer. (Author)
AD-658 876 HC$3.00 MF$0.65

OBSERVATIONS OF PARTICLE MOTIONS IN OCEAN WAVES. VOLUME II. APPENDICES.
Technical memo.,
Naval Underwater Weapons Research and Engineering Station Newport R I
D. H. Shonting. Jul 67, 205p Rept no. NUWS-TM-377-Vol-2
See also AD-658 876.

Descriptors: (*Ocean waves, Motion), Particles, Kinetic energy, Attenuation, Wind, Equations of motion, Velocity, Measurement, Tides, Computer programs, Oceanology.

Ducted impeller wave meters were suspended from the Buzzards Bay Entrance Light Station to measure particle motions in wind waves at various depths beneath the free surface. The motions recorded display quasisinusoidal oscillations having an approximate 90 degrees phase shift between the horizontal and vertical velocity components that lie normal to the wave crests. The wave kinetic energy associated with the variances in the wave motions shows a strong depth attenuation, but this attenuation is not as great as the exponential energy decrease exhibited by a classical trochoidal wave. Integrals of the wave kinetic energy contained in the water column were approximately equal to the estimated potential energy of the waves. (Author)
AD-658 877 HC$3.00 MF$0.65

OCEANOGRAPHIC SHIP OPERATING SCHEDULES, FISCAL YEAR 1968.
Interagency Committee on Oceanography Washington D C
For primary bibliographic entry see Field 8J.
AD-658 884 HC$3.00 MF$0.65

8E. Geodesy

EXCERPT FROM THE REPORT OF THE SOVIET GEOPHYSICAL COMMITTEE, ACADEMY OF SCIENCES OF THE USSR, TO THE 14TH GENERAL ASSEMBLY OF THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS.
American Meteorological Society Boston Mass
For primary bibliographic entry see Field 8N.
AD-658 824 HC$3.00 MF$0.65

8F. Geography

COMPUTATION OF GRAVITY CORRECTIONS FOR THE TERRAIN RELIEF WITH THE AID OF ELECTRONIC DIGITAL COMPUTERS.
Technical translation,
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
V. V. Lomtadze. Aug 67, 10p
ACIC-TC-1294, TT-67-62921
Vychislenie Popravok Sily Tyazhesti za Relyef Mestnosti s Pomoschyu ETSVM, trans. of Neftegazovaya Geologiya i Geofizika (USSR) n8 p43-5 1966.

Descriptors: (*Terrain, Mathematical analysis), Gravity, Computer programs, Terrain models, Topology, Digital computers.

A method for the computation of topographic corrections with the aid of an electronic digital computer is discussed in this translation. This system is characterized by the direct computation of the corrections for the points of observation Mk, whose coordinates Xk, Yk, Hk are fed into the computer, and by the elimination from the computations of the interpolation of the corrections and elevations. Integral can be computed numerically only. For computer calculations, the relief of the terrain is generally given in a tabular form with a square network. The described method assumes that the relief is in the form of the so-called numerical terrain model. For each section of the terrain corresponding to a square of the numerical model, the mean value of the elevation above sea level is determined and recorded. (Author)
AD-658 713 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF PARAGUAY,

Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-175 999 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF THE REPUBLIC OF VIETNAM,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 000 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF MONGOLIA,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 001 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF NORTH VIETNAM,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 002 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF HAITI,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 003 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE CLIMATE OF LEBANON,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 004 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON CLIMATIC MAPS OF LEBANON,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 005 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS FOR AUSTRALIA,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 007 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF TURKEY (SECONDARY),
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 008 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY OF CLIMATIC MAPS FOR NIGERIA AND THE BRITISH CAMEROONS,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 009 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON CLIMATIC MAPS OF THE NETHERLANDS,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 010 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON CLIMATIC MAPS OF LIBYA,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 011 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY OF CLIMATIC MAPS ON CUBA,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 012 HC$3.00 MF$0.65

ANNOTATED BIBLIOGRAPHY OF THE CLIMATE OF THE CAUCASUS,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 013 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY OF CLIMATIC MAPS FOR FINLAND,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 014 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY ON THE CLIMATE OF THE SOUTH PACIFIC ISLANDS,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 015 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY ON THE CLIMATE OF NORWAY,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 016 HC$3.00 MF$0.65

SUPPLEMENTARY BIBLIOGRAPHY ON THE CLIMATE OF GERMANY 1950-1957,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 018 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF CUBA,
Weather Bureau of Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 019 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF CYPRUS,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 020 HC$3.00 MF$0.65

BIBLIOGRAPHY ON CLIMATE OF MALTA AND GIBRALTAR,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 021 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF INDOCHINA II,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 022 HC$3.00 MF$0.65

SECONDARY BIBLIOGRAPHY ON THE CLIMATE OF IRAQ.
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 023 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF IRAN,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 024 HC$3.00 MF$0.65

SUPPLEMENT TO THE BIBLIOGRAPHY ON THE CLIMATE OF GREENLAND,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 025 HC$3.00 MF$0.65

ANNOTATED BIBLIOGRAPHY OF CLIMATIC MAPS OF JORDAN,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 027 HC$3.00 MF$0.65

SELECTED ANNOTATED BIBLIOGRAPHY OF CLIMATIC MAPS FOR GREECE,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 028 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY OF CLIMATIC MAPS FOR THE WESTERN PACIFIC OCEAN,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 029 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS FOR ETHIOPIA, ERITREA, AND THE SOMALILANDS,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 030 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS OF INDOCHINA,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 031 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS OF MOROCCO,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 032 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS OF TUNISIA,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 033 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF IRAQ.
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 035 HC$3.00 MF$0.65

BIBLIOGRAPHY ON CLIMATIC MAPS FOR FRANCE,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 036 HC$3.00 MF$0.65

SELECTED BIBLIOGRAPHY OF CLIMATIC MAPS FOR THE SOUTHWEST PACIFIC OCEAN,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 037 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS FOR IRAQ,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 038 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS FOR IRELAND,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 039 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS OF GERMANY,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 040 HC$3.00 MF$0.65

Group 8F—Geography

BIBLIOGRAPHY OF CLIMATIC MAPS OF THE ARABIAN PENINSULA,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 041 HC$3.00 MF$0.65

BIBLIOGRAPHY OF CLIMATIC MAPS: EASTERN MEDITERRANEAN,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 042 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON CLOUD INFORMATION AND DATA FOR MAINLAND CHINA,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 043 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY OF CLIMATIC MAPS OF SWEDEN,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 046 HC$3.00 MF$0.65

BIBLIOGRAPHY OF THE CLIMATE OF TURKEY,
Weather Bureau, Washington, D. C.
For primary bibliographic entry see Field 4B.
PB-176 048 HC$3.00 MF$0.65

8G. Geology and Mineralogy

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 9B.
AD-658 439 HC$3.00 MF$0.65

COCCOLITHOPHORIDS FROM TWO CARIBBEAN DEEP-SEA CORES,
Miami Univ Fla Inst of Marine Science
C. L. D. Cohen. 1964, 20p Rept no. Contrib-516
Grant NSF-G-21220
Research supported in part by NONR.
Availability: Published in Micropaleontology v10 n2 p231-50 6p Apr 1964.

Descriptors: (*Micropaleontology, *Plankton), Marine geology, Sea water, Sedimentation, Distribution, Temperature.
Identifiers: Coccolithophorids.

Evidence is presented in support of a relationship between certain species of coccolithophorids derived from selected samples of two Pleistocene deep-sea cores and the associated sea-water paleotemperatures. An explanation is given for the observed fact that a greater variety of species was found in samples from core levels deposited during cold (glacial) periods. Identifications of the most characteristic species are included. (Author)
AD-658 694 Not available from CFSTI.

GEOLOGICAL STUDIES OF THE WEST INDIES,
Miami Univ Fla Inst of Marine Science
Robert J. Hurley. 1966, 12p Rept no. Contrib-642
Grant NSF-GP-4197
Availability: Published in Proceedings of the International Upper Mantle Project, Continental Margins and Island Arcs (Ottawa, Canada), Geological Survey of Canada, Paper 66-15 p139-50 1966.

Descriptors: (*Structural geology, *Sedimentation), Volcanoes, Faults (Geology), Reflection, Seismology, Metamorphic rock, Gravity, Erosion, Sedimentary rock, Manganese, Deformation, West Indies.

Dredging and seismic reflection profiles show that the Aves Ridge is at least partly volcanic in origin but vertical movements appear to have been slight and only one small and shallow guyot has been found. Reflection lines in the northern Lesser Antilles indicate that the younger vulcanism has not migrated westward but that it was initiated on a line diverging westward from the original volcanic arc. Other reflection lines do not show the South Caribbean Fault north of Trinidad but do show the Tertiary sediments which outcrop in Barbados are more extensively distributed on the Barbados Ridge. It is suggested that these sediments were derived from the north flank of an east-west trending Late Cretaceous mountain range in northern Trinidad but that they are separated from the central basin of Trinidad to the south. A relationship may exist between the filling of a trench and its later compression and uplift. (Author)
AD-658 696 Not available from CFSTI.

LATE PLEISTOCENE AND HOLOCENE SEDIMENTATION IN THE LAURENTIAN CHANNEL,
Lamont Geological Observatory Palisades N Y
J. R. Conolly, H. D. Needham, and Bruce C. Heezen. 10 Mar 66, 28p Rept no. Contrib-1003
Grant NSF-GA-580
Research supported in part by NONR and Bell Telephone Labs.
Availability: Published in The Journal of Geology v75 n2 p131-46 Mar 1967.

Descriptors: (*Structural geology, *Sedimentation), Paleontology, Sedimentary rock, Deep water, Abrasives, Calcite, Quartz, Feldspar, Sand, Clay, Iron oxides, Deposits, Ice, Glaciers, Igneous rock.

Reddish-brown glacial-marine sediment was deposited in the Laurentian Channel during the late Pleistocene. The sediment contains calcite, quartz and feldspar grains with relic iron oxide rims, and red calcite-cemented lithic sandstone and arkosic rock fragments derived principally from Triassic (and/or Carboniferous-Permian) sediments of Appalachian Canada or from their reworked derivatives. Two 10-23-cm.-thick brick-red tills, 70-350 cm. apart and containing concentrations of the above detritus, lie within the glacial marine sediment; both tills thin and converge seaward. The pebbles, granules, and sand show little evidence of glacial abrasion and may have been derived from the adjacent shallow shelf and transported by ice which advanced over the deep waters of the Laurentian Channel. If the brick-red tills were deposited at the ice front, they are time-transgressive beds within a wedge of glacial marine sediment. A strong sub-bottom reflector correlates in some areas with the upper brick-red till and in other areas with sand beneath the lower brick-red till. Brown silty clays and clayey silts lie above this reflector and, together with overlying gray sediment, are generally more than 20 feet thick and thin seaward and toward the channel walls. The coarse fraction of the gray sediments consists chiefly of angular quartz, feldspar, and amphibole-rich granodioritic rock fragments derived from the crystalline rocks of eastern Quebec. (Author)
AD-658 697 Not available from CFSTI.

POSTGLACIAL-GLACIAL CHANGE IN CLIMATE IN THE INDIAN OCEAN,
Lamont Geological Observatory Palisades N Y
John R. Conolly. 28 Mar 67, 3p
Grant NSF-GP-5538
Research supported in part by US Navy. Prepared in cooperation with Scripps Institution of Oceanography, and Sydney Univ. (Australia).
Availability: Published in Nature v214 n5091 p873-5 May 27 1967.

Descriptors: (*Foraminifera, Indian Ocean), (*Geologic age determination, Australia), Northern hemisphere, Southern hemisphere, Climatology, Glaciers, Sedimentary rock, Marine geology, Oceans.

A change from a cold to a warmer climate is known to have taken place in the Northern Hemisphere 11,000 years ago. The foraminiferal faunas of deep-sea cores obtained off the south coast of Western Australia reveal that postglacial warming also occurred at about this time in the Southern Hemisphere.
AD-658 698 Not available from CFSTI.

HIGH-TEMPERATURE ELASTICITY AND EXPANSIVITY OF FORSTERITE AND STEATITE.
Land-Air Inc Holloman N Mex
For primary bibliographic entry see Field 11B.
AD-658 701 Not available from CFSTI.

PLEISTOCENE AGE DETERMINATIONS FROM CALIFORNIA AND OREGON,
Lamont Geological Observatory Palisades N Y
Horace G. Richards, and David L. Thurber. 21 Mar 66, 1p Rept no. Contrib-912
Grants Nonr (G)-00036-65, NSF-GP-4913
Prepared in cooperation with Academy of Natural Sciences, Philadelphia, Pa.
Availability: Published in Science v152 n3725 p1091-2 May 20 1966.

Descriptors: (*Geologic age determination, Paleontology), Mollusca, Shellfish, Marine biology, Deposits, Carbonates, Radioactive series, Thorium, Carbon, California, Oregon.

Mollusks have been collected from Pleistocene marine deposits at Tomales Bay, California, and Cape Blanco, Oregon. Dating by the carbon-14 and thorium-230-uranium-234 methods suggests that the shells are at least 33,000 years old. The more probable age of the Tomales Bay locality is greater than or equal to 50,000 years. (Author)
AD-658 703 Not available from CFSTI.

MARINE DOLOMITE OF UNUSUAL ISOTOPIC COMPOSITION,
Oregon State Univ Corvallis Dept of Oceanography
K. L. Russell, K. S. Deffeyes, G. A. Fowler, and R. M. Lloyd. 7 Nov 66, 2p
Contract Nonr-1286 (10), Grant NSF-GP-4649
Prepared in cooperation with Shell Development Co., Houston, Tex.
Availability: Published in Science v155 n3759 p189-91 Jan 13 1967.

Descriptors: (*Sedimentary rock, Isotopes), Carbonates, Stratigraphy, Clay, Foraminifera, Sedimentation, X-ray diffraction analysis, Quartz, Marine biology, Radioactive isotopes.

A piston core taken off of the coast of Oregon in 358 meters of water contained an indurated calcareous layer composed partly of dolomite with a composition Ca58.7Mg41.3. Dolomites of this chemical composition are typical of the supratidal environment. However, the dolomite has isotopic composition deltaO18 = 5.8 per mille, deltaC13 = -35.1 per mille relative to the Chicago PDB-1 standard. The unusual carbon isotope ratio is similar to that of calcites produced as a byproduct of bacterial breakdown of hydrocarbons. (Author)
AD-658 707 Not available from CFSTI.

BASIC FEATURES OF FORMATION AND DEVELOPMENT OF THE CAUCASUS IN CONNECTION WITH ITS DEEP-SEATED STRUCTURE.
Technical translation.
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
A. A. Sorskii. Aug 67, 23p
ACIC-TC-1225, TT-67-62938
Osnovnye Cherty Stroyeniya i Razvitii Kavkaza v Sviyazi s Ego Glubinnoi Structuroi, trans. of

mono. Glubinnoe Stroenie Kavkaza, Moscow, 1966, p22-34.

Descriptors: (*Structural geology, USSR), Geophysical prospecting, Mountains, Geological survey, Sedimentation, Thickness, Stratigraphy.

Because of geophysical achievements, the problems of the structure and development of the great downward flexures of the earth's crust have become more timely. There is an apparent connection between superficial tectonic phenomena and the structure and development of the abyssal zones. Caucasus, a part of a vast Alpine folded zone is of special interest for a comparison between visible and abyssal tectonic structures. This translation is a detailed study of the geological structure. The study brings forth considerations which are only hypothetical and represent an attempt of outlining the general connections between the abyssal structure, the history of development and the tectonics of the Caucasus. The history of geological development indicates an extreme structural-historical differentiation of Caucasus. Geophysics together with geology can achieve much in the studies of the abyssal fractures of the area. Many transverse profiles must be constructed in order to obtain a precise idea on the structure of the abyssal discontinuities within the limits of the Kura and Terek depressions. As a whole, only complex geological-geochemical-geophysical investigations can shed light on all the complicated aspects of the structure of the Caucasus, which will be important from the practical and theoretical points of view. (Author)

AD-658 712 HC$3.00 MF$0.65

TECTONIC STRUCTURE OF THE YAKUTIAN AUTONOMOUS SOVIET SOCIALIST REPUBLIC.

Technical translations,
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
K. B. Mokshantsev. Aug 67, 471p
ACIC-TC-1148, TT-67-62923
Trans. of mono. Tektonicheskoe Stroenie Yakutskoi USSR, Moscow 1964 291p.

Descriptors: (*Structural geology, USSR), (*Geology, USSR), Deposits, Minerals, Sedimentary rock, Geology, Maps, Mapping, Geophysics, Faults (Geology), Shale, Limestone, Carbonates, Thickness, Metamorphic rock, Detection, Siberia.

The translation is a discussion of the tectonic structure of the Yakutian Autonomous SSR. Various commercial minerals were disclosed in this area. In order to provide a scientific base for detection of these minerals, a seven-year period of extensive geological studies is being conducted. An attempt is being made to find laws governing the distribution of commercial minerals. This is the first works on tectonics of Yakutia taken as a whole. It contains personal observations by the authors. As far as possible, the whole complex of existing geological and geophysical data was taken into consideration for the compilation of the tectonic map of Yakutia, since the completed geological studies of it were of a very diverse quality. The existing tectonic charts and diagrams of different scales were taken as a base for relatively small sections. (Author)

AD-658 715 HC$3.00 MF$0.65

VARIATION IN THE ELASTIC CONSTANTS OF CALCITE WITH PRESSURE.

Doctoral thesis,
Chicago Univ Ill Dept of the Geophysical Sciences
Dattatraya Purushottam Dandekar. Jun 67, 51p
Grants NSF-GP-3351, NSF-GP-134

Descriptors: (*Calcite, Pressure), (*Mechanical waves, Calcite), Elasticity, Aragonite, Velocity, Limestone, Steel, Density, Thickness, Crystallography, Instrumentation, Theses.

The values of six elastic constants of single crystal calcite are determined to 6 kb at 25 C by the pulse-echo method. The ambient values of these constants agree fairly well with those obtained by Peselnick and Robie. The values of C-33, and C-66 do not change with pressure to 6 kb. These values are, respectively, 8.53 plus or minus 0.05 and 4.33 plus or minus 0.07 x 10 to the 11th power dynes/sq cm. The C-11 increases linearly from 14.65 x 10 to the 11th power dynes/sq cm at one atm. to 14.70 x 10 to the 11th power dynes/sq cm at 6 kb. The increases in the magnitude of C-13 and C-14 are non-linear. The variation of C-44 shows a maximum between 3 -4 kb. The possible reasons for such a maximum are qualitatively discussed. These results do not show any evidence of drastic change in the behaviour of calcite to 6 kb. (Author)

AD-659 036 HC$3.00 MF$0.65

ARCHEOLOGICAL SALVAGE EXCAVATIONS ON THE MESITA DEL BUEY, LOS ALAMOS COUNTY, NEW MEXICO,

Los Alamos Scientific Lab., N. Mex.
Frederick C. V. Worman. Jan 67, 39p
Contract W-7405-eng-36

Descriptors: (*Archaeology, New Mexico), (*Radioactive waste, Disposal), Geology, Maps, Classification.

For abstract, see NSA 21 19.

LA-3636 HC$3.00 MF$0.65

BIBLIOGRAPHY OF LIESEGANG RINGS (2d. Ed.).

National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
For primary bibliographic entry see Field 7D.
NBS-Misc Pub-292 HC$0.40 MF$0.65

CONSTRUCTION AGGREGATE AVAILABILITY STUDY, SUMMARY REPORT: HIGHWAY DISTRICT IV,

Connecticut Highway Dept. Soils and Foundations Div.
For primary bibliographic entry see Field 13C.
PB-176 057 HC$3.00 MF$0.65

8H. Hydrology and Limnology

DESIGN AND DEVELOPMENT OF ULTRASONIC SCOUR METER MODEL 1055.

Automation Industries, Inc., Boulder, Colo. Research Lab.
For primary bibliographic entry see Field 13B.
PB-175 920 HC$3.00 MF$0.65

OPERATION AND MAINTENANCE MANUAL FOR ULTRASONIC SCOUR METER MODEL 1055, APPENDIX B.

Automation Industries, Inc., Boulder, Colo. Research Lab.
For primary bibliographic entry see Field 13B.
PB-175 921 HC$3.00 MF$0.65

8J. Physical Oceanography

POSTGLACIAL-GLACIAL CHANGE IN CLIMATE IN THE INDIAN OCEAN,

Lamont Geological Observatory Palisades N Y
For primary bibliographic entry see Field 8G.
AD-658 698 Not available from CFSTI.

LIGHT SCATTERING IN THE SEA,

Lamont Geological Observatory Palisades N Y
For primary bibliographic entry see Field 20F.
AD-658 702 Not available from CFSTI.

ELECTROLYTIC CONDUCTANCE OF SEA WATER AND THE SALINOMETER. AN ADDENDUM TO THE REVIEW,

Oregon State Univ Corvallis Dept of Oceanography
Kilho Park, and Wayne V. Burt. 19 Nov 65, 5p
Contract Nonr-1286 (10), Grant NSF-GP-2232
Availability: Published in Journal of the Oceanographical Society of Japan v22 n1 p25-8 Feb 1966.

Descriptors: (*Sea water, *Salinometers), (*Conductivity, Sea water), Carbonates, Salinity, Measurement, Accuracy, Reviews.

Reliable and precise in situ salinometers certainly will facilitate many oceanographic investigations where the accuracy of the salinity determination is not too critical. SOPACH (1958) studied the influence of disolved oxygen, pH, and trace elements on the conductivity of sea water. He found that these effects are normally small and within 0.01-0.02% salinity equivalent. In analytical chemistry, conductometric determination of an ionic constituent of solution is a common practice. A sea-going conductometric apparatus to determine the alkalinity of sea water is being assembled. (Author)

AD-658 704 Not available from CFSTI.

TRACK CHARTS, BATHYMETRY, AND LOCATION OF OBSERVATIONS, YAMACRAW CRUISE NO. 3, AUGUST 9-AUGUST 26, 1957; YAMACRAW CRUISE NO. 6, NOVEMBER 4-NOVEMBER 10, 1957, NORTH ATLANTIC OCEAN.

Technical rept.,
Woods Hole Oceanographic Institution Mass
W. M. Dunkle, and K. G. Bumpus. May 67, 87p
Rept no. WHOI-Ref-67-28
Contract Nonr-4029 (00)

Descriptors: (*Oceanographic data, Atlantic Ocean), Underwater sound, Bathythermograph data, Time, Velocity, Oceanographic vessels.

The report contains charts of YAMACRAW Cruise Nos. 3 and 6 in the North Atlantic Ocean. There are 25 (Cruise No. 3) and 8 (Cruise No. 6) charts plotted on a Mercator Projection (Scale 1 degree longitude equals 4 inches) showing the track of the entire cruise. All types of observations made during the cruise are noted by suitable symbols or legends along the ship's track. The location of special observations are shown on Charts I and II (Cruise No. 3) and Chart I (Cruise No. 6). Soundings are read at equal time intervals, usually every ten minutes, and at each break in slope. They are written along the ship's track as often as space permits. All soundings are based on a sound velocity of 800 fathoms/sec. and are corrected only for depth-of-transducer. (Author)

AD-658 711 HC$3.00 MF$0.65

OCEANOGRAPHIC SHIP OPERATING SCHEDULES, FISCAL YEAR 1968.

Interagency Committee on Oceanography Washington D C
Jul 67, 64p Rept no. ICO Pamphlet-31
See also AD-645 543.

Descriptors: (*Oceanographic vessels, Scheduling), Oceanology, Operation, Scientific organization, United States government.

The document gives the planned schedules, type of work, and general areas of operation for all government-owned or sponsored oceanographic ships of the United States.

AD-658 884 HC$3.00 MF$0.65

8K. Seismology

PROGRAMA DE CALCULO ELECTRONICO PARA LOCALIZACION DE SISMOS PROXIMOS

EN LA REGION DE LA PENINSULA IBERICA (The Electronic Computer Program for Localization of Near Seismic in the Iberian Penisula Region),
Instituto Geografico Y Catastral Madrid (Spain)
J. M. Munuera, and S. J. A. Udias. 1967, 34p
AFOSR-67-2156
Contract AF 61 (052)-657
Text in Spanish; attached summary in English.

Descriptors: (*Computer programs, *Seismic waves), Earthquakes, Spain, Portugal, Models (Simulations), Lithosphere, Velocity.
Identifiers: EPICO.

The paper describes the computer program for epicentral determination, EPICO, which has been prepared for a IBM 1620. The program is based on another of the University of Saint Louis (U. S. A.), presenting several variations; especially, the computation for the critical distances corresponding to foci in different layers of the assumed model of the crustal structure. The output shows the standard deviation of the travel time, from data of 19 stations, by means successive approximations following the Geiger method to a preliminary epicentral determination and for each hipocentral depth, till reaching a difference in time lower than that which have been given in the input, or SD lower than 2 sec, and through three trials as a maximum. The program processes the number of hipocentral depths proposed in the input, and uses a crustal structure model with 4 velocities and 3 thicknesses. The program eliminates the stations which error is higher than 1.5 SD, and also those stations exceeding 1000 km, in epicentral distance. This last distance is sufficient, in general, for the earthquakes in the Iberian Peninsula, which are recorded on the local stations. The output lists the epicentral coordinates, origin time, the standard deviation, station names and arrival time, epicentral distance, travel time and its deviation, and also the parameters corresponding to the crustal structure model, focal depth and particular identification of the epicenter.
AD-658 484 HC$3.00 MF$0.65

TRAVEL - TIME ANOMALIES AT LASA,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 17J.
AD-658 492 HC$3.00 MF$0.65

AMPLITUDE ANOMALIES AT LASA,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 17J.
AD-658 495 HC$3.00 MF$0.65

GEOLOGICAL STUDIES OF THE WEST INDIES,
Miami Univ Fla Inst of Marine Science
For primary bibliographic entry see Field 8G.
AD-658 696 Not available from CFSTI.

GROUND MOTION DIAGRAMS FROM PULSE TRANSMISSION THROUGH SIMPLE LAYERED STRUCTURES.
Revised ed.,
Utah Univ Salt Lake City Dept of Geophysics
John K. Costain, Edwin S. Robinson, and Kenneth L. Cook. 30 Jan 67, 6p Rept no. Contrib-77
Contract AF 19 (628)-201, Grant NSF-GP-4648
Revision of manuscript submitted 5 Aug 66.
Availability: Published in Journal of Geophysical Research v72 n10 p2577-82 May 15 1967.

Descriptors: (*Seismic waves, Underground), (*Nuclear explosions, Seismic waves), Motion, Velocity, Thickness, Density, Terrain, Structural geology, Refraction, Seismometers, Theory, Computers, Fourier analysis.

By computing theoretical seismograms and ground motion diagrams for assumed source functions passed through simple layered models, it is possible qualitatively to reproduce ground motion patterns and apparent beat frequency patterns that characterize some long range seismic measurement (LRSM) recordings of underground nuclear explosions. Interference of overlapping phases may result in ambiguous arrival times for later phases. Ground motion diagrams are useful for identifying shear motion that is not obvious on seismograms. (Author)
AD-658 700 Not available from CFSTI.

8L. Snow, Ice, and Permafrost

SOME OBSERVATIONS ON THE DENSIFICATION OF ALPINE SNOW COVERS.
Technical rept.,
Cold Regions Research and Engineering Lab Hanover N H
Charles M. Keeler. Jul 67, 19p Rept no. CRREL-TR-197

Descriptors: (*Snow, Density), Physical properties, Compressive properties, Viscosity, Mathematical analysis, Deposition, Temperature, Polar regions.

Through pit measurements on selected deep seasonal snow covers, observations have been made on the densification rates of dry snows. The variation between rates has been compared with such physical characteristics of the snow as temperature, grain size, and loading rate. The rate of densification does not appear to be affected by temperature in the -1 to -10 degrees C range but it is inversely proportional to grain size and sensitive to rates of loading during the formative stage of any particular snow layer. Values of compressive viscosity vary from 100,000 to 10 to the 9th power gm/sq cm per second which is an order of magnitude less than the lowest values for polar snow. Plots of specific volume against overburden reveal a sharp discontinuity at a specific volume of about 3.0 cu cm/gm. The persistence of this discontinuity from location to location indicates that it may reflect a real phenomenon. It is suggested that it may be accounted for by extremely high strain rates at low densities. (Author)
AD-658 656 HC$3.00 MF$0.65

8M. Soil Mechanics

CBE FACTORS: MONTHLY SURVEY NO. 17.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-658 438 HC$3.00 MF$0.65

ACTIVE ARCHING OF SAND DURING DYNAMIC LOADING: RESULTS OF AN EXPERIMENTAL PROGRAM AND DEVELOPMENT OF AN ANALYTICAL PROCEDURE.
Technical rept.,
Naval Civil Engineering Lab Port Hueneme Calif
H. L. Gill. Sep 67, 37p Rept no. NCEL-TR-541

Descriptors: (*Sand, Loading (Mechanics)), Structural properties, Soil mechanics, Deformation, Compressive properties, Soils, Blast, Underground structures, Experimental data.

The ultimate purpose of this study of soil arching is to enable the economical design of reliable underground protective structures. Idealized small-scale structures were embedded in prepared specimens of dry sand, and long-duration, dynamic overpressures of various magnitudes up to 440 psi were applied to the surface of the sand. Foundation area and depth of soil cover over the structures were the primary variables during the tests. Measurements were made to evaluate the interrelationships between depth of soil cover, dynamic overpressure, soil stiffness, structural response, and soil arching. Soil arching over a particular soil-structure system subjected to dynamic loading was found to be a function of the geometry and the relative stiffness of that system. The geometry is accounted for by the perimeter-area ratio of the structure multiplied by the depth of the soil cover. The stiffness portion of the factor relates the soil stiffness to the stiffness of response of the structure relative to the free-field soil. (Author)
AD-658 502 HC$3.00 MF$0.65

A METHOD FOR DERIVING PREDICTIONS OF SOIL TEMPERATURE FROM MEDIUM-RANGE WEATHER FORECASTS.
Technical memo.,
Weather Bureau, Silver Spring, Md. Weather Analysis and Prediction Div.
Charles F. Roberts. Jun 67, 18p WBTM-FCST-7

Descriptors: (*Soils, Temperature), (*Weather forecasting, *Agriculture), Atmospheric temperature, Heat transfer, Seeds, Boundary value problems, Mathematical analysis.

A method for predicting daily mean soil temperatures at any depth in the upper layers of the soil from predictions of maximum and minimum temperatures is developed and illustrated. The method is based on well-known solutions to the classical heat condition equations with variable boundary conditions. (Author)
PB-175 773 HC$3.00 MF$0.65

SOME CHEMICAL PROPERTIES OF FOREST SOILS IN THE VIRGINIA-CAROLINA PIEDMONT.
Southeastern Forest Experiment Station, Asheville, N. C.
For primary bibliographic entry see Field 2F.
PB-176 081 HC$3.00 MF$0.65

8N. Terrestrial Magnetism

PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON EQUATORIAL AERONOMY (2d),
Laboratorio de Fisica Espacial Sao Jose Dos Campos (Brazil)
For primary bibliographic entry see Field 4A.
AD-658 489 HC$3.00 MF$0.65

A REPRESENTATION OF THE ANOMALOUS GRAVITATIONAL FIELD.
Technical translation,
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
M. A. Aleksidze. Aug 67, 11p
ACIC-TC-1295, TT-67-62920
Ob Odnom Predstavlenii Anomalnogo Gravitatsionnogo Polya, trans. of Akademiya Nauk SSSR. Doklady. Seriya Matematika, Fizika v170 n4/6 p828-30 1966.

Descriptors: (*Gravity, Earth (Planet)), (*Mathematical analysis, Gravity), Anomalies, Theory, Algorithms, USSR.

M. S. Molodenskiy posed the following question: Is it impossible to construct on the surface of the sphere such a system of anomalies which would determine together with the field of the normal earth, the external gravitational field coinciding upon surface S (and consequently also beyond S) with the gravitational field of the real earth. In this article M. S. Molodenskiy's problem is solved positively. The proof shown is constructive from the point of view that it is simultaneously the algorithm of the solved problem. (Author)
AD-658 714 HC$3.00 MF$0.65

EXCERPT FROM THE REPORT OF THE SOVIET GEOPHYSICAL COMMITTEE, ACADEMY OF SCIENCES OF THE USSR, TO THE 14TH GENERAL ASSEMBLY OF THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS.
Research trans.
American Meteorological Society Boston Mass
Aug 67, 40p Rept no. T-R-669
TT-67-62939
Contract AF 19(628)-3880
Trans. of mono. Izvlechenie iz Otcheta Mezhduvedomstvennogo Geofizicheskogo Komiteta pri Prezidiume Akademii Nauk SSSR XIV Generalnoi Assamblee Mezhdunarodnogo Soyuza Geodezii i Geofiziki, Moscow, 1967 47p.

Descriptors: (*Terrestrial magnetism, USSR), (*Geodesics, Symposia), Gravity, Earth (Planet), Integral equations, Deflection, Measurement, Density, Theory, Anomalies.

The report is an excerpt from the report of the Soviet Geophysical Committee, Academy of Sciences of the USSR, to the 14th General Assembly of the International Union of Geodesy and Geophysics. The report on the determination of the figure, dimensions, and gravitational field of the earth relates scientific research and its approach to the problem. (Author)
AD-658 824 HC$3.00 MF$0.65

UNIVERSAL-TIME CHANGES IN THE GEOMAGNETIC SOLAR QUIET DAILY VARIATION Sq,
Washington Univ., Seattle. Dept. of Atmospheric Sciences.
Masahisa Sugiura, and M. Patricia Hagan. Jul 67, 37p
Grant NSF-GA-478
Prepared in cooperation with Emmanuel Coll., Boston, Mass.

Descriptors: (*Terrestrial magnetism, Diurnal variations), Anomalies, Ionosphere, Magnetosphere, Maps, Mathematical analysis.

Forty-eight spherical harmonic coefficients, g subscript n, superscript m, and h subscript n, superscript m, up to n = 4, m = 4 are determined by the method of least squares for the external and internal parts of the scalar magnetic potential of Sq for each UT hour of selected five quiet days, May 20 to 24, 1958, using magnetic data from 66 observatories distributed over the world between dipole latitudes 58.3 degrees N and 47.6 degrees S. Agreement between the input data for the three orthogonal components and the values computed with the determined coefficients is found to be generally excellent except for the observatories near the dip equator where the effect of the equatorial electrojet is large. Remarkable regularity is seen in the UT variations of the spherical harmonic coefficients.
PB-176 073 HC$3.00 MF$0.65

9. ELECTRONICS AND ELECTRICAL ENGINEERING

9A. Components

SEMICONDUCTOR RELIABILITY.
Final rept.,
Arinc Research Corp., Washington, D. C.
George J. Blakemore, Edward T. Kronson, and William H. Alven. 31 Jul 63, 414p Rept. no. 239-01-4-383
Contract NObsr-87664

Descriptors: (*Semiconductor devices, Reliability (Electronics)), Life expectancy, Electrical properties, Monte Carlo method, Tables, Diodes (Semiconductor), Transistors, Crystal rectifiers, Tunnel diodes, Least squares method, Statistical analysis, Distribution theory.
Identifiers: Weibull parameters.

The main objectives of the program were to determine quality assurance requirements for specific semiconductor devices, and to determine confidence limits for the shape parameter beta of the Weibull distribution. A summation of the main findings of the research program is given. Of particular interest is the finding that integral circuits used in digital applications are potentially as reliable as a single discrete transistor used in digital applications. Another finding of significance is that the distribution of field removal rates for diodes in regulator and rectifier applications is approximately the same as the distribution of field removal rates for transistors used in amplifier or high-power applications. On the average, the removal rates for devices in analog (amplifier) applications are approximately 300 times higher than the rates for devices in digital applications. (Author)
AD-437 692 HC$3.00

ELECTRICAL POWER DISTRIBUTION AT 400Hz TO TACTICAL GROUND UNITS.
Tactical Air Command Langley AFB Va
For primary bibliographic entry see Field 10B.
AD-658 444 HC$3.00 MF$0.65

TRANSMITTER TUBE INVESTIGATION.
Final technical rept. 1 Apr 66-30 Apr 67,
Eimac San Carlos Calif
C. Marshall Loring, and Gordon Liljegren. Aug 67, 134p Rept no. TR-67-10
RADC-TR-67-343
Contract AF 30(602)-4205

Descriptors: (*Electron tubes, Noise (Radio)), Radiofrequency power, High frequency, Radiofrequency amplifiers, Modulation, Magnetic fields, Cooling, Radio transmitters, Performance (Engineering), Reduction.

An investigation was made of characteristics of certain h.p.h.f. tubes capable of at least 100KW peak output power at up to 32 MHz which contribute to the generation of individual spurious lines in the transmitted spectrum in excess of 90db below the maximum output power. The objective was to identify noise sources within the tubes and recommend design changes to reduce the spurious outputs to the desired levels. The program resulted in a thorough noise generation evaluation of the particular class of tubes, recommended design changes to further reduce the noise generation, and noted significant factors that should enable equipment designers to minimize the noise outputs of existing tubes. (Author)
AD-658 491 HC$3.00 MF$0.65

MAGNETIC COMPRESSION OF ELECTRON BEAMS.
Quarterly rept. no. 8, 1 Apr-30 Jun 67,
Hughes Research Labs Malibu Calif
Kurt Amboss. Sep 67, 21p
ECOM-01463-8
Contract DA-28-043-AMC-01463 (E)
See also AD-653 793.

Descriptors: (*Electron beams, Magnetic fields), Electron guns, Compressive properties, Velocity, Thermal properties.

The objective of this program is to compress a perveance 0.0000054 A/V to the 3/2 power electron beam by a factor of 1000 and to gain an understanding of the behavior of the beam. The experimental approach involves the probing of a scaled-up beam in suitable magnetic fields and the subsequent demonstration of compression in a sealed-off tube with a beam of the correct size. The theoretical approach has been to extend the linear optical theory to include nonlinear effects. The sealed-off beam tester was constructed and tested during this quarter. For reasons that are not yet understood, initial testing revealed no beam current to the collector. The beam tester was reassembled with a drift tube 0.034 in. in diameter replacing the 0.014 in. diameter tube, and transmission was obtained. Tests indicated that the collector had to be redesigned and that part of the body current resulted from electrons reflected from the collector. These tests are continuing. Compression experiments in the demountable beam tester on a perveance 0.000017 A/V to the 3/2 power. (Author)
AD-658 680 HC$3.00 MF$0.65

COUPLERS FOR CALIBRATION OF EARPHONES,
National Academy of Sciences-National Research Council Washington D C Comm on Hearing Bioacoustics Biomechanics
For primary bibliographic entry see Field 6E.
AD-658 726 HC$3.00 MF$0.65

TIME-DOMAIN APPROXIMATION BY ITERATIVE METHODS.
Revised ed.,
Princeton Univ N J Dept of Electrical Engineering
L. E. McBride, Jr., H. W. Schaefgen, and K. Steiglitz. 17 Jun 66, 9p
AROD-5105:20
Contract DA-31-124-ARO(D)-292, Grant NSF-GK-270
Revision of manuscript submitted 30 Aug 65.
Availability: Published in IEEE Transactions on Circuit Theory vCT13 n4 p381-7 Dec 1966.

Descriptors: (*Integral transforms, Iterative methods), (*Delay lines, Iterative methods), Networks, Convergence, Approximation (Mathematics), Optimization, Mathematical analysis, Simulation.

An iterative procedure is presented which permits the determination of a rational transfer function in the Laplace transform variable s which is optimal with respect to given input and output time-functions. The optimal system of a particular order is defined as the one whose output when subjected to the known input function is nearest in the time integral square sense to the desired output function. The method is thus applicable to a number of problems involving the minimization of an integral square error. To illustrate the technique, a set of optimal lumped-parameter delay lines is synthesized and their characteristics investigated; the behavior and convergence of the iteration in these problems is also studied. A comparison of other iterative methods applicable to the same problems leads to the conclusion that the proposed procedure has real advantages in computational simplicity and speed of convergence. (Author)
AD-658 810 Not available from CFSTI.

PROPAGATION IN WAVEGUIDES FILLED WITH WARM PLASMA,
Case Inst of Tech Cleveland Ohio
Philip W. Nield. Jun 67, 186p Rept no. Scientific-16
AFCRL-67-0419
Contract AF 19(628)-1699

Descriptors: (*Waveguides, Plasma medium), (*Wave transmission, *Plasma medium), Propagation, Microwaves, Magnetic fields, Iterative methods, Boundary value problems, Equations, Potential theory.
Identifiers: Helmholtz equation.

The linearized equations describing the propagation of the normal modes in a plasma filled waveguide at microwave frequencies and in the presence of an axial constant magnetic field are derived from moments of the Boltzmann equation. Collisions are retained. For two cases where the plasma is assumed to be drifting but uniform or stationary but non-uniform in the transverse plane it is possible to completely solve for the fields by

solving a set of coupled equations for the axial electric and magnetic fields and the pressure. If the plasma is assumed to be stationary and uniform these reduce to a set of coupled Helmholtz equations. Solutions for this case are considered in detail. The equations can be simplified considerably and cast into a form very similar to those used to describe wave propagation in a cold plasma. Solutions are obtained by employing an iterative technique. (Author)
AD-658 828 HC$3.00 MF$0.65

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5A.
AD-658 834 HC$3.00 MF$0.65

P-I-N THERMO-PHOTO-VOLTAIC DIODE,
Purdue Univ Lafayette Ind School of Electrical Engineering
For primary bibliographic entry see Field 10A.
AD-658 902 HC$3.00 MF$0.65

QUARTZ FREQUENCY STANDARDS.
Revised ed.,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
E. A. Gerber, and R. A. Sykes. 19 Jan 67, 10p
Revision of manuscript submitted 8 Dec 66.
Availability: Published in Proceedings of the IEEE v55 n6 p783-91 Jun 1967.

Descriptors: (*Quartz, *Crystal oscillators), (*Frequency, Standards), Vibrators (Mechanical), Precision finishing, Stability, Aging (Materials), Synthetic stones, Temperature, Adsorption, Tests.

The paper reviews progress made over the past few years in the field of quartz crystal frequency standards. Several accomplishments which are thought to be of special importance are discussed in detail. These subjects include, among others, quartz vibrator enclosures, modes of motion including the 'trapped energy' concept, and studies of quartz material. It has been demonstrated that the Q of synthetic quartz can be improved to a value equivalent to natural quartz. Progress made in the field of long-term stability of precision crystal units is described and the various reasons for aging of such units is discussed. The characteristics of precision crystal oscillators are reviewed, including temperature compensation and the influences of severe environment. The properties of high-precision crystal frequency standards are described with specific emphasis on aging, and the problem of short-term stability of such standards is discussed. Precision crystal standards are available today with a daily drift rate as low as a few parts in 10 to the 11th power and a short-term stability better than a few parts in 10 to the 10th power for a period of one millisecond. (Author)
AD-658 936 Not available from CFSTI.

PLANE-WAVE SHIELDING EFFECTIVENESS STUDIES OF THIN FILMS,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
Robert A. Weck, and Carl J. Lump. 13 Feb 67, 3p
Availability: Published in Proceedings of the IEEE p596-8 Apr 1967.

Descriptors: (*Films, Shielding), Vacuum apparatus, Vapor plating, Effectiveness, Copper, Aluminum, Gold, Silver, Nickel, Electrical impedance, Conductivity.

A novel technique for determining the plane-wave shielding effectiveness of thin films utilizing a TEM mode structure has been previously described. The letter presents some of the results obtained. In addition, note is made of an error which existed in the original measurement setup and its effect on the results is discussed. (Author)
AD-658 945 Not available from CFSTI.

INCREASED RESISTANCE OF CRYSTAL UNITS AT OSCILLATOR NOISE LEVELS,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
M. Bernstein. 7 Apr 67, 3p
Availability: Published in Proceedings of the IEEE v55 n7 p1239-41 Jul 1967.

Descriptors: (*Quartz resonators, Defects (Materials)), Surface properties, Etching, Reliability (Electronics), Noise (Radio), Crystal oscillators, Resistance (Electrical).

Problems have been experienced with inoperative military equipment which have been traced to a defect in some quartz crystal units. This defect has been determined to be an increase in resistance (loss of Q) of crystal resonators when excited at very low power levels. The typical crystal oscillator, when first turned on, excites the resonator with thermal noise and consequently the power dissipated is very small. Simple instrumentation has been assembled to show clearly the low power increased crystal resistance effect. Tests have shown that surface defects, due to the final lapping process, contribute to the problem. The necessity of surface etch to remove the damaged surface layer is shown to be required to avoid defective crystal units. (Author)
AD-658 947 Not available from CFSTI.

DESCRIPTION OF AXISYMMETRIC WAVE PROPAGATION IN A UNIFORM, FINITE, SOLID ELECTRON BEAM.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 20C.
AD-658 987 HC$3.00 MF$0.65

LOW TEMPERATURE CATHODES FOR CROSSED-FIELD DEVICES.
Final rept. 10 Jun 59-30 Jun 61,
Westinghouse Electric Corp Elmira N Y Electronic Tube Div
I. Brodie. Jul 61, 113p
Contract NObsr-77640

Descriptors: (*Cathodes (Electron tubes), Thermionic emission), (*Crossed field devices, Cathodes (Electron tubes)), Noise (Radar), Noise (Radio), Oxides, Coatings, Nickel, Performance (Engineering), Oxide cathodes, Powder metallurgy, Barium, Impregnation, Platinum, Rhenium, Measurement, Space charges.

In seeking a low noise, low temperature, thermionic cathode suitable and flicker noise. These investigations showed the rhenium-based barium dispenser cathode to be the most promising from the point of view of low noise applications. These studies also proved extremely useful in elucidating the physical nature of noise generation in some of these cathodes. The results on space charge reduction of noise demonstrated that with certain of the cathodes new, but not identified, mechanisms for noise generation other than emission fluctuations become dominant when they are operated space charge limited.
AD-659 056 HC$3.00 MF$0.65

DEVELOPMENT OF GLASS PASSIVATION METHOD FOR SEMICONDUCTOR DEVICES FOR SATURN SYSTEM QUARTERLY PROGRESS REPORT, 28 JUN. - 28 SEP. 1966.
Philco Corp., Blue Bell, Pa. Microelectronics Div.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 05 21.
N67-35628 HC$3.00 MF$0.65

DEVELOPMENT OF A 100 WATT S-BAND TRAVELING-WAVE TUBE QUARTERLY PROGRESS REPORT.
Watkins-johnson Co., Palo Alto, Calif.
M. V. Purnell, and L. A. Roberts. 14 Apr 67, 26p
NASA-CR-88023, QPR-1
Contracts NAS7-100, JPL-951299
Prepared for Jpl

Descriptors: *Electron gun, *S-band, *Traveling wave tube, Capsule, Collector, Design, Development, Electric, Electron, Gun, Space, Tube, Wave.

For abstract, see STAR 05 21.
N67-35644 HC$3.00 MF$0.65

ESFK 20-100 WATT S-BAND AMPLIFIER.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Varian Associates, San Carlos, Calif. Eimac Div.
E. L. Lien, and A. Mizuhara. Apr 67, 37p NASA-CR-88116, QR-1
Contracts NAS7-100, JPL-951105
Prepared for Jpl

Descriptors: *Communication system, *Interplanetary communication, *Klystron, *Spacecraft electronic equipment, Band, Beam, Communication, Conductance, Development, Efficiency, Electronic, Electrostatic, Equipment, Focus, Interplanetary, Narrow, Resonator, S-band, Spacecraft, System, Transmission.

For abstract, see STAR 05 21.
N67-35999 HC$3.00 MF$0.65

DESIGN AND FABRICATION OF AN ANALOG VOLTAGE TO DUTY CYCLE GENERATOR INTERIM PROGRESS REPORT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Westinghouse Electric Corp., Pittsburgh, Pa. Research Labs.
Apr 67, 28p NASA-CR-88129, IPR-4
Contracts NAS7-100, JPL-951306
Prepared for Jpl

Descriptors: *Analog-to-digital converter, *Generator, *Integrated circuit, Amplifier, Analog, Circuit, Converter, Cycle, Design, Digital, Duty, Fabrication, Film, Integration, Nitride, Tantalum, Thin, Voltage.

For abstract, see STAR 05 21.
N67-36031 HC$3.00 MF$0.65

R.R.E. NEWSLETTER AND RESEARCH REVIEW.
Royal Radar Establishment, Malvern (England). Ministry of Technology.
For primary bibliographic entry see Field 17I.
For abstract, see STAR 05 21.
N67-36063 HC$3.00 MF$0.65

DEVELOPMENT OF A 100 WATT S-BAND TRAVELING-WAVE TUBE QUARTERLY REPORT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Watkins-johnson Co., Palo Alto, Calif.
M. V. Purnell, and L. A. Roberts. 12 Jun 67, 27p
NASA-CR-88000, QR-3
Contracts NAS7-100, JPL-951299
Prepared for Jpl

Descriptors: *S-band, *Spacecraft electronic equipment, *Traveling wave tube, Beam, Collector, Design, Electronic, Equipment, Fabrication, Gain, High efficiency, Output, Performance, Power, Spacecraft, Testing, Thermal, Tube, Vibration, Wave.

For abstract, see STAR 05 21.
N67-36281 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT ON AN ELECTRON- SENSITIVE SOLID STATE MATRIX FINAL REPORT.
Westinghouse Electric Corp., Baltimore, Md. Defense and Space Center.
Sep 67, 121p NASA-CR-866
Contract NAS5-3446

Descriptors: *Electron detector, *Solid state device, Barrier, Detector, Device, Diode, Electron, Electronics, Low energy, Matrix, Photocathode, Radiation, Sensitivity, Solid, State, Surface, Tube.

For abstract, see STAR 05 21.
N67-36507 HC$3.00 MF$0.65

FLAT CONDUCTOR CABLE MANUFACTURE AND INSTALLATION TECHNIQUES.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
W. Angele. Mar 67, 28p NASA-TM-X-53586

Descriptors: *Conductor, *Flat surface, *Manufacturing, Apollo project, Cable, Connector, Flat, Hardware, Harness, Installation, Saturn s- ivb stage, Surface.

For abstract, see STAR 05 21.
N67-36554 HC$3.00 MF$0.65

9B. Computers

LISP 2 GARBAGE COLLECTOR SPECIFICATIONS.
Technical memo.,
System Development Corp Santa Monica Calif
J. Barnett. 26 Apr 67, 18p Rept no. TM-3417/500/00
Contract F19628-67-C-0004

Descriptors: (*Data storage systems, Management planning), Programming languages, Programming (Computers), Coding, Algorithms.
Identifiers: LISP, IBM 360.

The document is intended to be a basis for further detailing of the work completed on storage management for LISP 2 on the IBM 360. It includes brief descriptions of housekeeping information, the four phases of garbage collection, the decentralization of primitives, the organization of the pushdown stack, and the role of various data zones. The relevance of these to the overall system is outlined, together with some of the remaining design and programming problems. (Author)
AD-658 416 HC$3.00 MF$0.65

LISP 2 COMPILER CONTEXT RESOLVER LANGUAGE AND PROCESSOR SPECIFICATIONS.
Technical memo.,
System Development Corp Santa Monica Calif
J. Barnett. 26 Apr 67, 28p Rept no. TM-3417/340/00
Contract F19628-67-C-0004

Descriptors: (*Digital computers, *Programming languages), (*Compilers, Digital computers), Data storage systems, Syntax.
Identifiers: LISP, IBM 360.

The document describes the language and processor required for the Context Resolver pass of the LISP 2 compiler proposed for the IBM S/360 computer. The Context Resolver (pass II of the LISP 2 compiler) is used to macro-expand Intermediate Language inputs into a list of Context-Resolved Interlude Language function definitions. (Author)
AD-658 418 HC$3.00 MF$0.65

LISP 2 INTERNAL STORAGE CONVENTIONS.
Technical memo.,
System Development Corp Santa Monica Calif
J. Barnett. 26 Apr 67, 29p Rept no. TM-3417/550/00
Contract F19628-67-C-0004

Descriptors: (*Digital computers, Magnetic core storage), (*Data storage systems, Classification), Programming languages, Coding, Scheduling.
Identifiers: LISP, IBM 360.

The document describes storage allocation conventions for the LISP 2 system proposed for the IBM S/360 computer. Core storage is to be partitioned into a large number of zones, each of which is classified according to the types of structural units that may occur within it. The configuration of each of the standard zones and its occupant units are described in detail. A scheme for the software paging of binary program space is outlined. (Author)
AD-658 419 HC$3.00 MF$0.65

LISP 2 DOCUMENT CONVENTIONS.
Technical memo.,
System Development Corp Santa Monica Calif
R. Wills. 26 Apr 67, 7p Rept no. TM-3417/001/00
Contract F19628-67-C-0004

Descriptors: (*Programming languages, *Syntax), (*Digital computers, Programming languages), Systems engineering, Symbols, Semantics, Standardization.
Identifiers: LISP, IBM 360.

The document describes conventions used in a series of documents which specify the LISP 2 language and processor for the IBM S/360 computer. Included in this document are rules for writing syntax equations for the LISP 2 language.
AD-658 420 HC$3.00 MF$0.65

LISP 2 LANGUAGE SPECIFICATIONS.
Technical memo.,
System Development Corp Santa Monica Calif
Donna Firth, and P. Abrahams. 26 Apr 67, 49p Rept no. TM-3417/200/00
Contract F19628-67-C-0004
Prepared in cooperation with Informational International, Inc., Los Angeles, Calif.

Descriptors: (*Programming languages, *Syntax), (*Digital computers, Programming languages), Semantics, Symbols, Coding.
Identifiers: LISP, IBM 360.

The document describes the proposed syntax and semantics for the LISP 2 Source Language (SL) and Intermediate Language (IL) to be implemented on the IBM S/360 computer. The syntax of tokens is also included. (Author)
AD-658 421 HC$3.00 MF$0.65

DIGITAL COMPUTER SIMULATION: MODELING CONCEPTS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-658 429 HC$3.00 MF$0.65

PLANET: PART I. AVAILABILITY AND BASE CADRE SIMULATOR,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 15E.
AD-658 431 HC$3.00 MF$0.65

OPERATIONAL SPECIFICATION FOR EXERCISE AND EVALUATION CAPABILITY,
Mitre Corp Bedford Mass
Louis Elias. Aug 67, 132p Rept no. MTR-277
ESD-TR-66-314
Contract AF 19 (628)-5165

Descriptors: (*Command + control systems, *Air Force training), (*Computers, Training devices), Specifications, Data processing systems, Simulation, Operation.

The document contains the Operational Specification for the Exercise and Evaluation capability. This capability provides a means of using the 473L computer to develop, conduct, and evaluate exercises of the USAF Command and Control System. The capability comprises three separate elements; Force Status Generation and Sequencing; Data Base Separation; and Simulation Monitoring. The Force Status Generation and Sequencing element allows the System Operator to use the 473L computer in the generation of Exercise Force Status and STATREP reports. It also provides a means of automatically entering STATREP reports into the system during an exercise. The Data Base Separation element provides a means of maintaining separation of the Exercise Data Base and the Live Data Base. This is a basic capability for conduct of an exercise. The ability to conduct limited live computer operations during an exercise is included. The Simulation Monitoring element provides a means of observing man-machine interactions during an exercise. This facilitates the simulation and observational functions of exercise personnel. (Author)
AD-658 436 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
Jul 67, 77p
TT-67-62909
A Monthly Review of Selected Foreign Scientific and Technical Literature. Also available on subscription, $36.00/yr.

Descriptors: (*Computer storage devices, Magnetic materials), (*Semiconductors, Materials), (*Launch vehicles (Aerospace), USSR), (*Scientific research, USSR), Scientific organizations, Geophysics, Aeronautics, Poland, Physics, Meteors, Whistlers, Polymers, Vulcanizates, Seismology, Rock (Geology), Mapping, Symposia, Scientific personnel.
Identifiers: Magnetic disk storage, Technological intelligence.

Contents: Papers: Magnetic disk development; Binary and ternary gallium- and indium-chalcogenide systems, Part I, gallium and indium monochalcogenide systems; Validity of the Soviet popular literature as a source of intelligence (the Vostok booster). Surveys: Organization and activities of the Polar Geophysical Institute; Polish Institute of Aeronautics; Theoretical physics at Leningrad University. Notes: Experiment to check a hypothesis on the anti-matter nature of meteor showers; Variation of average hourly VHF signal strength over mountainous terrain of the Transbaikal; Stable polymers with triazine rings in the backbone; The effect of low-molecular-weight additives on the morphology and mechanical properties of vulcanized rubbers. Conferences: All-union Symposium on the seismic regime; Second all-union conference on the International Project entitled 'The Upper Mantle of the Earth and its influence on the Development of the Earth's Crust'; The first all-union conference on the rheology of rocks; Second scientific-technical conference on cartography. Personalities: Academician S. P. Korolev. Book reviews: Deserts of Central Asia.
AD-658 439 HC$3.00 MF$0.65

MERGE,
Mitre Corp Bedford Mass
I. Beilin. Aug 67, 40p Rept no. MTR-271
ESD-TR-67-371
Contract AF 19 (628)-5165

Descriptors: (*Computer programs, Data processing systems), Subroutines, Data storage systems, Flow charting.
Identifiers: FORTRAN, MERGE.

A general purpose 7030 computer program has been written in the FORTRAN environment to merge in a single run of the program two, three, or four tape files which are the resulting output from a sort program. These files may be more than one tape in length and may be either FORTRAN or non-FORTRAN formatted. Input and output processors have been designed to handle various types of item formats; the program accepts items of fixed length, variable length - identified by a predesigned terminator - and variable length with a length defining field. Upon request, the output processor will eliminate duplicate items and/or fill in variable length records to a standard size. (Author)
AD-658 446 HC$3.00 MF$0.65

A GRAPHIC TABLET DISPLAY CONSOLE FOR USE UNDER TIME-SHARING.
Professional paper,
System Development Corp Santa Monica Calif
L. Gallenson. 11 Aug 67, 18p Rept no. SP-2835/000/01
For presentation at the Fall Joint Computer Conference, Anaheim, Calif., November 14-16, 1967.

Descriptors: (*Time sharing, *Input-output devices), (*Display systems, Time sharing), Man-machine systems, Data processing systems, Magnetic core storage, Graphics, Flow charting, Programming (Computers), Computer storage devices, Computer logic, Cathode ray tubes.

The problems of using highly interactive graphic consoles with a time-shared processor are discussed in this paper. Some solutions to these problems are given and are illustrated in the graphic tablet display (GTD) console used with the SDC Time-Sharing System (TSS). Also described in this paper are the components of the GTD, its interface with the TSS, and its operation. The GTD console employs a rear-projection display on a RAND Tablet, improving the 'naturalness' of man-machine communication. The GTD/TSS interface takes advantage of an existing I/O preprocessor to provide the necessary response time for most of the console's highly interactive functions. (Author)
AD-658 470 HC$3.00 MF$0.65

THE MADAM SYSTEM: DATA MANAGEMENT WITH A SMALL COMPUTER.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-658 472 HC$3.00 MF$0.65

TECHNOLOGICAL CHANGE AND PUBLIC ADMINISTRATION.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 5K.
AD-658 473 HC$3.00 MF$0.65

APPLICATIONS OF COMPUTERS IN EDUCATION.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 5K.
AD-658 476 HC$3.00 MF$0.65

THE SDC TIME-SHARING SYSTEM REVISITED.
Professional paper,
System Development Corp Santa Monica Calif
Jules I. Schwartz, and Clark Weissman. 11 Aug 67, 30p Rept no. SP-2876
Presented at the 1967 National ACM Conference, Washington, D. C., 29-31 August 1967.

Descriptors: (*Time sharing, Reviews), (*Data processing systems, Time sharing), Predictions, Computer storage devices, Input-output devices, Programming languages, Management planning, Costs, Flow charting, Magnetic core storage, Efficiency, Maintenance.
Identifiers: On-line systems, LISP, List processing.

The SDC Time-Sharing System (TSS), which operates on an IBM AN/FSQ-32 computer at System Development Corporation, Santa Monica, was originally described in a paper entitled 'A General-Purpose Time-Sharing System,' published in 1964. TSS has now been in operational use for four years, serving a large and varied community of local and remote users. This paper describes the present capabilities of TSS, discusses the critical problems of resource management (and the solutions to those problems employed in TSS), and reviews the authors' original statements regarding the advantages of time-sharing for such tasks as on-line programming and debugging. The techniques for managing CPU time, storage media, and user/system interaction are described in some detail. An attempt is made to point out the weak as well as the strong points of TSS, and to indicate some of the effects that systems such as TSS have had upon computing technology. (Author)
AD-658 477 HC$3.00 MF$0.65

AN ETHICAL AND MORAL ANALYSIS OF THE DESIGN FOR A MAN-MACHINE COUNSELING SYSTEMS: REACTIONS BY A UCLA GRADUATE CLASS IN COUNSELING.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 5K.
AD-658 482 HC$3.00 MF$0.65

STUDIES IN PROBLEM SOLVING: SUBJECT 3 ON THE CRYPT-ARITHMETIC TASK DONALD + GERALD = ROBERT,
Carnegie-Mellon Univ Pittsburgh Pa Dept of Computer Science
For primary bibliographic entry see Field 5J.
AD-658 485 HC$3.00 MF$0.65

STUDY OF HIGH PACKING DENSITY/HIGH TRANSFER RATE ENCODER/DECODER.
Final rept.,
Massachusetts Inst of Tech Lexington Lincoln Lab
John Wood. 1 Apr 66, 175p
ESD-TR-67-318
Contract AF 19(628)-5167
Prepared in cooperation with Orion Products, Inc., Sunnyvale, Calif.

Descriptors: (*Data storage systems, *Data processing systems), Density, Magnetic tape, Errors, Digital systems, Input-output devices, Narrowband, Reliability, Phase modulation.

The report covering the narrow band/phase modulated (NB/PM) digital encoding/decoding technique deals primarily with the evaluation of this system in terms of digital bit error rates as a function of digital bit packing density. The evaluation is based on a series of comprehensive tests conducted by controlled procedures. The collated results of all the tests are presented in graphical form to show quantitatively the overall performance of this system in a statistical manner. (Author)
AD-658 496 HC$3.00 MF$0.65

AN IMAGE STORAGE TUBE COMPUTER.
Technical note,
Philco-Ford Corp Newport Beach Calif Aeronutronic Div
Jack Sklansky. 25 Jul 67, 48p Rept no. TN-67-40
Contract Nonr-2913 (00)

Descriptors: (*Computers, Storage tubes), (*Images, Computers), Data storage systems, Integral transforms, Image tubes, Algorithms, Programming languages, Graphics, Theorems, Topology.

Contents: Introduction; Basic theory; The image storage tube language; Two-storage-tube algorithms: Algorithms and commands requiring three storage tubes; An algorithm for enhancing elongated objects; Conclusions; Topological processing.
AD-658 521 HC$3.00 MF$0.65

RESEARCH ON SELF-ORGANIZING MACHINES.
Final rept.,
Stanford Research Inst Menlo Park Calif
Richard O. Duda. Sep 67, 31p
Contract Nonr-3438 (00)

Descriptors: (*Pattern recognition, Mathematical models), (*Learning machines, Pattern recognition), Accuracy, Mapping (Transformations), Convergence, Iterative methods, Training, Classification.
Identifiers: Self-organizing systems.

This report reviews the results of a program of research on self-organizing machines. This research was primarily directed at establishing the conditions under which iterative machine-learning procedures can be guaranteed to converge. The most significant result of this effort was the development of a fairly complete theory of the linear machine, an important trainable multicategory pattern classifier. Theoretical results are summarized and related to the present state of research in pattern recognition. (Author)
AD-658 527 HC$3.00 MF$0.65

PULSE CODE INFORMATION RECEIVER,
Foreign Technology Div Wright-Patterson AFB Ohio
V. F. Dmitriev. 24 Feb 67, 7p Rept no. FTD-HT-66-732
Unedited rough draft trans. of Patent (USSR) 176 623, appl. 880900/26-24, 10 Feb 64.

Descriptors: (*Data processing systems, Pulse systems), Logic circuits, Circuits, Pulse generators, Shift registers, USSR, Patents.

A pulse-code information receiver is described. To simplify the entire system, an AND element is provided; its output is coupled to the register input, and its input is connected to the register output through the channel divider. (Author)
AD-658 651 HC$3.00 MF$0.65

A SOURCE-ANGLE INTEGRATION PROGRAM FOR THE NGM CODE OUTPUT,
Army Nuclear Defense Lab Edgewood Arsenal Md
For primary bibliographic entry see Field 18K.
AD-658 671 HC$3.00 MF$0.65

CIRCULAR RING REDUNDANTS.
Picatinny Arsenal Dover N J Data Processing Systems Office
For primary bibliographic entry see Field 13M.
AD-658 683 HC$3.00 MF$0.65

THREE-DIMENSIONAL ELASTICITY THEORY FOR FLAT-PLATE MEMORY ELEMENTS SUBJECTED TO SPACE-VARIABLE NORMAL TRACTION.
Technical rept.,
Columbia Univ New York Dept of Mechanical Engineering
H. G. Elrod, and Des R. Sood. Jul 67, 69p Rept no. TR-9
Contract Nonr-4259 (14)
Rept. on proj. Mechanical and Fluid Dynamical Aspects of Problems Associated with Computer Technology. Task 1, Tape Transport. See also AD-802 009.

Descriptors: (*Computer storage devices, *Elasticity), Boundary value problems, Digital computers, Stresses, Strain (Mechanics), Flat plate models, Bending, Mathematical analysis.

Many of the contemporary memory elements used in high-speed digital computers are flat in the unstressed state. The present work is part of a review and enlargement of applicable elasticity theory in cases of small deformation with space-variable normal traction or pressure. (1) All flat plate results are derived directly with three-dimensional linear elasticity theory - none of the conventional intermediate assumptions being employed. (2) Within the exact theory, certain auxiliary functions are shown to satisfy conventional thin-plate differential equations. In terms of these functions, displacements, stresses, stress resultants and couples are simply expressed by formulas which are either exact, or asymptotically accurate. Boundary conditions are mathematically equivalent to those of Michell plate theory. (3) Solutions obtained from the present theory are 'interior solutions' in the sense of Friedrichs and Dressler (3) and accommodate Kirchoff edge conditions. Their use with more general edge conditions will be the subject of a later report. (Author)
AD-658 727 HC$3.00 MF$0.65

A GRAPH DECOMPOSITION TECHNIQUE FOR STRUCTURING DATA.
Computer Command and Control Co Washington D C
For primary bibliographic entry see Field 12B.
AD-658 756 HC$3.00 MF$0.65

ANALOG SOURCE DIGITIZATION: A COMPARISON OF THEORY AND PRACTICE.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 9D.
AD-658 776 Not available from CFSTI.

CONIC DISPLAY GENERATOR USING MULTIPLYING DIGITAL-ANALOG CONVERTERS.
Revised ed.,
Massachusetts Inst of Tech Lexington Lincoln Lab
Lawrence G. Roberts. 28 Jan 67, 3p Rept no. JA-2779
ESD-TR-67-498
Contract AF 19 (628)-5167, ARPA Order-691
Revision of manuscript submitted 14 Apr 66.
Availability: Published in IEEE Transactions on Electronic Computers vEC-16 n3 p369-70 Jun 1967.

Descriptors: (*Display systems, Waveform generators), (*Computers, Display systems), Graphics, Conical bodies, Digital-to-analog converters, Data processing systems.

A simple waveform generator for display systems has been designed on the basis of homogeneous coordinate mathematics. This generator will draw points, lines, and general conic sections. The fundamental waveform used is the parabola. Circles, ellipses, and hyperbolas are merely perspective transformations of the basic parabola, which is represented by the parametric vector t = (t to the 2nd power, t, 1). The design of the homogeneous conic generator is based upon the assumption that a multiplying digital-to-analog decoder can be built economically. The decoder produces an output voltage proportional to the product of a ten-bit digital number and a positive reference level; it must maintain 0.1 percent accuracy up to about 100 kHz. In its simplest form the generator would contain 11 decoders. Allowing subpicture scaling and centering requires 14; adding cubics requires 18; and the most complicated system, with three-dimensional cubics with a final perspective transformation as well as the two-dimensional transformation, requires 34 decoders. (Author)
AD-658 796 Not available from CFSTI.

SOVIET CYBERNETICS: RECENT NEWS ITEMS NO. 8,
Rand Corp Santa Monica Calif
Wade B. Holland. Sep 67, 120p Rept no. P-3600/8 TT-67-62940
See also AD-655 761.

Descriptors: (*Computers, USSR), (*Cybernetics, USSR), Programming (Computers), Technical information centers, Information retrieval, Automation, Production control, Digital computers, Control systems, Reliability, Input-output devices, Data storage systems, Punched cards, Computer storage devices, Magnetic core storage, Magnetic tape.

In this issue: Brief items; Computer production reform and western practices advocated; Need for enterprise computer centers; Shortcomings of management systems; Large computer centers, machines needed; A 'tradition' of unreliability; Problems of academy computer centers; Information retrieval conference; Technical specifications: M-20, BESM-3M, BESM-4, M-220; Kazakh mathematics and mechanics institute criticized; Three products of electronics industry: photos; Institutes receive awards; Press summary, August 1967.
AD-658 818 HC$3.00 MF$0.65

THE DYNAMIC CHARACTERISTICS OF COMPUTER PROGRAMS,
Rand Corp Santa Monica Calif
G. E. Bryan. Aug 67, 28p Rept no. P-3661
Prepared for presentation at the Annual Meeting of SHARE (22nd), San Francisco, 2-6 March 1964.

Descriptors: (*Programming (Computers), Efficiency), Scheduling, Digital computers, Data processing systems, Data storage systems, Algorithms, Computer programs.
Identifiers: Multiprocessing, List processing.

The report gives statistics which indicate that substantial gains are achievable through a multiplexed program mode of operation. Substantial numbers of programs exist in the small-time and small-program size categories to insure that programs can be easily found which will fit available time-space slots. Further, because of these factors, rather simple allocation algorithms will be sufficient. Also shown is that there are substantial gains to be achieved in storage allocation areas--both in list processing styles of storage allocation in which both the location and its contents are important data in the storage reference, and in the dynamic storage requests in which tables of nominal size are expended to fill the needs of the program as it executes. It would not be overstating the case to predict that an efficiency or through-put gain of 100 percent is achievable through implementation of these techniques.
AD-658 819 HC$3.00 MF$0.65

NATURAL COMMUNICATION WITH COMPUTERS.
Final rept. 15 Mar 65-31 Aug 67,
Bolt Beranek and Newman Inc Cambridge Mass
Daniel G. Bobrow. 31 Aug 67, 38p Rept no. BBN-1548
AFCRL-67-0485
Contract AF 19 (628)-5065, ARPA Order-627-2

Descriptors: (*Computers, *Man-machine systems), Abstracts, Syntax, Time sharing, Real time, Information retrieval, Display systems, Semantics, Programming languages, Data storage systems, Compilers, Data processing systems, Digital computers.
Identifiers: LISP, On-line systems, List processing.

The report discusses results concerning problems affecting computer communications with people, other computers, and real-time devices, as found within the 2 years of the contract.
AD-658 829 HC$3.00 MF$0.65

PROPERTIES OF CELLULAR ARRAYS FOR LOGIC AND STORAGE,
Stanford Research Inst Menlo Park Calif
B. Elspas, J. Goldberg, C. L. Jackson, W. H. Kautz, and H. S. Stone. Jul 67, 185p Rept no. Scientific-3
AFCRL-67-0463
Contract AF 19 (628)-5828
See also AD-647 086.

Descriptors: (*Computer logic, *Data storage systems), Theory, Groups (Mathematics), Switching circuits, Functions, Iterative methods, Logic circuits.

This report presents results of research on cellular logic techniques. The objective of the research has been to develop techniques for the efficient realization of general logical functions in cellular arrays. The report covers the subjects of theory and application of cascade decompositions; universal logic module studies; sampled sequence detectors, serial universal logic modules, and iterative multirail cascades; programmed-logic arrays; and diagnosis and testing of cellular arrays. (Author)
AD-658 832 HC$3.00 MF$0.65

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5A.
AD-658 834 HC$3.00 MF$0.65

A COMPUTERIZED 3-D PLOTTING PROGRAM.
Rept. for Nov 66-Jun 67,
Aerospace Corp El Segundo Calif Labs Div
R. L. Mitchell. Jun 67, 22p Rept no. TR-1001 (2230-46)-9
SSD-TR-67-146
Contract AF 04 (695)-1001

Descriptors: (*Mechanical drawings, *Computer programs), Surfaces, Graphics.

A conceptually simple computer plotting program has been developed that provides an efficient method of plotting a projection of a three-dimensional surface with remarkable clarity, even if the surface comprises a large amount of detail. The method consists of plotting successive parallel cuts of the surface, each displaced to establish the desired projection. Only that portion of the cut that lies above the previous cuts is then plotted. The plotting sometimes requires several hours, depending on the speed of the computer and on the complexity of the function, but the cost need not be excessive since a relatively small computer can be used. A few of the functions that have been plotted are discussed in some detail. (Author)
AD-658 857 HC$3.00 MF$0.65

FUNDAMENTAL STUDIES RELATING TO THE RADIATION CHEMISTRY OF SMALL ORGANIC MOLECULES.
Johnston (William H) Labs Inc Baltimore Md
For primary bibliographic entry see Field 7E.
AD-658 864 HC$3.00 MF$0.65

A DIGITAL AIRBORNE METEOROLOGICAL DATA COLLECTION SYSTEM,
Dayton Univ Ohio Research Inst
For primary bibliographic entry see Field 4B.
AD-658 865 HC$3.00 MF$0.65

STUDY OF MODULAR SYNTHESIS OF SEQUENTIAL MACHINES.
Final rept. Apr 66-Jun 67,
Lockheed Missiles and Space Co Palo Alto Calif
Lockheed Palo Alto Research Lab

Andrew J. Nichols, III. Aug 67, 36p Rept no. LMSC-L-74-67-1 AFCRL-67-0484 Contract AF 19 (628)-5875

Descriptors: (*Computers, Sequences), Synthesis, Theory, Mathematical models, Switching circuits, Computer logic.
Identifiers: Sequential machines.

The problem of synthesizing sequential machines with modules with a single input is considered. It is shown that there is a one-to-one correspondence between modules and certain partitions of the set of states of the machine. These partitions are called modular partitions and it is shown that the modular partitions of a given machine are related to a structure of the machine induced from the null partition. Necessary conditions for the existence of modular partitions of various types and bounds on the number of modular partitions for a given machine are derived. These results aid the designer in the synthesis of a given machine and provide basic results for further studies of modular synthesis. (Author)
AD-658 867 HC$3.00 MF$0.65

COMPUTER-ASSISTED INSTRUCTION (CAI).
Harvard Computing Center Cambridge Mass
For primary bibliographic entry see Field 5I.
AD-658 869 HC$3.00 MF$0.65

THE HARVARD UNIVERSITY COMPUTER-ASSISTED INSTRUCTION LABORATORY.
Harvard Computing Center Cambridge Mass
For primary bibliographic entry see Field 5I.
AD-658 873 HC$3.00 MF$0.65

A COMPUTER PROGRAM FOR FACTOR ANALYSIS OF PHYSICAL PROPERTIES.
Stevens Inst of Tech Hoboken N J
For primary bibliographic entry see Field 12A.
AD-658 991 HC$3.00 MF$0.65

ON THE CONSTRUCTION OF PROGRAMMING DEVICES WITH MONITORING AND CORRECTION,
Foreign Technology Div Wright-Patterson AFB Ohio
M. B. Ignatev, and V. V. Mikhailov. 18 Aug 67, 20p Rept no. FTD-MT-67-42 TT-67-62970
Edited machine trans. of mono. K Postroeniyu Programmiruyushchikh Ustroistv s Kontrolem i Korrektsiei, n.p., 1964 p161-72.

Descriptors: (*Programming (Computers), Errors), Computer logic, Monitors, Corrections, Failure (Electronics), Control, USSR.

The report is an incorporation of redundancies into the problems under consideration which would permit the control and correction of computer solutions if they contain errors caused by the incorrectness of the calculational algorithms, and by random machine component failures. In contradistinction to the known approaches the proposed approach allows the control and correction of the solution as a whole and may be used in machines with series or parallel action of the discrete, analog, or combined types. The present paper investigates in detail the establishment of devices with controls and corrections intended for the reproduction of functions specified by finite equations. (Author)
AD-659 022 HC$3.00 MF$0.65

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON FAST CRITICAL EXPERIMENTS AND THEIR ANALYSIS HELD AT ARGONNE NATIONAL LABORATORY, ILLINOIS, OCTOBER 10-13, 1966.
Argonne National Lab., Ill.
1966, 818p
CONF-661019
Contract W-31-109-eng-38

Descriptors: (*Fast reactors, *Reactor safety systems), (*Power reactors, *Reactor fuels), (*Breeder reactors, *Reactor cores), Critical assemblies, Symposia, Computer programs, Detectors.

For abstract, see NSA 21 19.
ANL-7320 HC$3.00 MF$0.65

USE OF COMPUTERS IN ANALYSIS OF EXPERIMENTAL DATA AND THE CONTROL OF NUCLEAR FACILITIES.
Argonne National Lab., Ill.
May 67, 306p
Contract W-31-109-eng-38
Prepared for presentation at symposium at Argonne National Lab., Ill. May 4-6, 1966.

Descriptors: (*Nuclear physics laboratories, *Digital computers), (*Experimental data, Computers), Control systems, Pattern recognition, Graphics.

For abstract, see NSA 21 19.
CONF-660527 HC$3.00 MF$0.65

RADOS A CODE TO ESTIMATE GAMMA DOSE FROM A CLOUD OF RADIOACTIVE GASES,
du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
Roger E. Cooper. Jun 67, 23p
Contract AT (07-2)-1

Descriptors: (*Gamma emission, Dose rate), (*Radioactivity, Programming (Computers)), Meteorological parameters.

For abstract, see NSA 21 19.
DP-1098 HC$3.00 MF$0.65

RAPID (REACTOR AND PLANT INTEGRATED DYNAMICS) COMPUTER PROGRAM,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
LA-3694 HC$3.00 MF$0.65

GRAMS A FORTRAN PROGRAM TO SOLVE GAMMA RAY PENETRATION PROBLEMS IN MULTISLAB SHIELDS. VOLUME I. NUMERICAL METHODS,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 19.
NAA-SR-12337-Vol-1 HC$3.00 MF$0.65

ANALOG COMPUTER STUDY OF THE DYNAMICS OF THE MRP COMBINED ROTATING UNIT SHAFT-BEARING SYSTEM. HYDROSTATIC FORCE IMPROVEMENT,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
NAA-SR-12411 HC$3.00 MF$0.65

METHOD OF ANALYZING DYNAMIC DATA CHARACTERIZED BY A TIME-VARYING FREQUENCY SPECTRUM.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A. D. Brenza. Sep 67, 16p NASA-TN-D-4161
Contract 124-09-05-03-22

Descriptors: *Frequency measurement, *Magnetic tape recorder, *Recording instrument, *Time dependency, Analysis, Characterization, Computer, Data, Dependency, Digital, Dynamic, Filter, Frequency, History, Instrument, Magnetic, Measurement, Plot, Recording, Tape, Time.

For abstract, see STAR 05 21.
N67-35592 HC$3.00 MF$0.65

A DIGITAL COMPUTER PROGRAM FOR CALCULATING STEADY TEMPERATURE AND DENSITY DISTRIBUTIONS IN A GAS CONTAINING HEAT SOURCES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 18K.
For abstract, see STAR 05 21.
N67-35762 HC$3.00 MF$0.65

TOWARD A GRASP OF PROCEDURE IN ALGORITHMIC LANGUAGES.
Zum Begriff Der Prozedur in Algorithmischen Sprachen
Technische Hochschule Munchen (West Germany). Fakultaet Fuer Allgemeine Wissenschaften.
G. Seegmueller. 1966, 100p
in German

Descriptors: *Computer program, *Machine language, Algol, Algorithm, Computer, Concept, Extension, Fortran, Function, Language, Machine, Parameter, Procedure, Program, Relation.

For abstract, see STAR 05 21.
N67-35950 HC$3.00 MF$0.65

COMPUTER EXPERIMENTS ON LOW DENSITY CROSSED- FIELD ELECTRON BEAMS.
Avco-everett Research Lab., Everett, Mass.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 21.
N67-36036 HC$3.00 MF$0.65

R.R.E. NEWSLETTER AND RESEARCH REVIEW.
Royal Radar Establishment, Malvern (England). Ministry of Technology.
For primary bibliographic entry see Field 17I.
For abstract, see STAR 05 21.
N67-36063 HC$3.00 MF$0.65

STUDY TRIP IN THE USSR.
International Information, Inc., Philadelphia, Pa.
M. Bancarel. Dec 66, 12p NASA-TT-F-10600
Contract NASW-1499
Transl. Into English of the Book "voyage D'etudes en Urss"

Descriptors: *Automatic data processing system, *Computer method, *Training, *U.S.S.R., Application, Automatic, Computer, Conference, Data, Description, Evaluation, Method, Operator, Processing, Program, System, Technology.

For abstract, see STAR 05 21.
N67-36083 HC$3.00 MF$0.65

AMC A MONTE CARLO CODE UTILIZING THE ALBEDO APPROACH FOR CALCULATING NEUTRON AND CAPTURE GAMMA-RAY DISTRIBUTIONS IN RECTANGULAR CONCRETE DUCTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 19.
ORNL-3964 HC$3.00 MF$0.65

DEVELOPMENT OF COMPUTER AIDS FOR TAPE-CONTROL OF PHOTOCOMPOSING MACHINES. REPORT NO. 2. EXTENSION OF THE SYSTEM OF PREPARING A COMPUTER-PROCESSED TAPE TO INCLUDE THE SETTING OF MULTIPLE LINE EQUATIONS.
American Mathematical Society, Providence, R. I.

For primary bibliographic entry see Field 14E.
PB-175 939 HC$3.00 MF$0.65

THE DATA TAPE SYSTEM AND CONTENTS OF DATA TAPES 3 AND 4,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 4B.
PB-175 964 HC$3.00 MF$0.65

THE DEVELOPMENT OF A READING MACHINE FOR THE BLIND.
Summary rept. 1 Jul 66-30 Jun 67,
Mauch Labs., Dayton, Ohio.
Glendon C. Smith, and Hans A. Mauch. 30 Jun 67, 67p
Contract V-1005m-1943

Descriptors: (*Reading machines, Sensory mechanisms), Blindness, Eye, Accuracy, Reading, Prosthetics, Design, Velocity.

The report describes the progress from July 1, 1966 through June 30, 1967 on the development of a personal type reading machine for the blind sponsored by the Veterans Administration, Prosthetics and Sensory Aids Service. The most advanced personal type reading machine being developed by Mauch Laboratories provides the blind user with the 'spelled speech' equivalent for each upper and lower case letter or ligature scanned by a hand held optical probe. The 'multiple snapshot' character recognition technique recognizes most popular type fonts with moderate accuracy (90-95%) and speed (80-90 words per minute) by using a special arrangement of CdSe photoconductors to sense letter features. The design objectives for the resulting recognition prototype II included improved recognition accuracy at high scanning speeds and increased tolerance for vertical mistracking. (Author)
PB-176 090 HC$3.00 MF$0.65

PROCESS VESSEL CALIBRATION, A TOOL FOR CONTROLLING MATERIAL UNACCOUNTED FOR (MUF),
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 19.
RFP-858 HC$3.00 MF$0.65

POLYNOMIAL CURVE FIT BY LEAST SQUARES,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
Harold E. Clark, Donald C. Coonfield, and Lynn E. Jackson. 11 Jul 67, 10p
Contract AT (29-1)-1106

Descriptors: (*Programming (Computers), Flow charting), Least squares method, Polynomials, Curve fitting.

For abstract, see NSA 21 19.
RFP-968 HC$3.00 MF$0.65

BISE A TWO-VERTEX KINEMATIC PROGRAM,
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 19.
UCRL-17473 HC$3.00 MF$0.65

9C. Electronic and Electrical Engineering

SPIN GENERATOR,
Foreign Technology Div Wright-Patterson AFB Ohio

For primary bibliographic entry see Field 14B.
AD-658 652 HC$3.00 MF$0.65

INFRARED AND GAS CHROMATOGRAPHIC STUDIES OF MAGNET-WIRE ENAMELS.
Naval Ship Research and Development Center Annapolis Md Annapolis Div
For primary bibliographic entry see Field 11C.
AD-658 724 HC$3.00 MF$0.65

SENSITIVITY AND STATE-VARIABLE FEEDBACK.
Arizona Univ., Tucson. Dept. of Nuclear Engineering.
R. C. White. Jul 67, 88p NASA-CR-88001
Contract NGR-03-002-115

Descriptors: *Automatic control, *Feedback control system, *Sensory feedback, Analysis, Automatic, Control, Dynamic, Feedback, Integral, Linear, Peak, Sensitivity, Sensory, State, System, Variable.

For abstract, see STAR 05 21.
N67-35917 HC$3.00 MF$0.65

HIGH-ACCURACY SPEED CONTROLLER USING PULSE COUNTING METHODS.
Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.
Y. Ishii. Jun 67, 14p ISAS-414, Vol. 32, No. 7

Descriptors: *Electric motor, *Speed regulation, Analog, Control, Controller, Counting, Digital, Electric, Error, High accuracy, Motor, Pulse, Regulation, Signal, Speed.

For abstract, see STAR 05 21.
N67-35936 HC$3.00 MF$0.65

SIMULATION AND ANALYSIS OF OPTIMAL SELF-PACED SECOND ORDER CONTROL SYSTEMS.
Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
P. A. Hardin. Jul 67, 29p NASA-CR-88201, DSR-70283-2
Grant NSG-107-61

Descriptors: *Algorithm, *Computer simulation, *Control system, *Dynamic programming, Computer, Control, Cost, Dynamic, Optimal, Programming, Resolution, Simulation, System, Trajectory.

For abstract, see STAR 05 21.
N67-35957 HC$3.00 MF$0.65

COMPUTER EXPERIMENTS ON LOW DENSITY CROSSED- FIELD ELECTRON BEAMS.
Avco-everett Research Lab., Everett, Mass.
R. W. Hockney, and R. H. Levy. Jun 67, 32p NASA-CR-88133, AVCO-EVERETT RES. REPT.-273
Contracts NAS8-20310, AF 49/638/-1553
Submitted for Publication

Descriptors: *Computer simulation, *Crossed field, *Electron beam, *Mathematical model, *Plasma instability, Analysis, Beam, Computer, Crossed, Electron, Field, Instability, Lagrange equation, Linear, Long, Low density, Mathematics, Model, Nonlinear, Plasma, Simulation, Wave.

For abstract, see STAR 05 21.
N67-36036 HC$3.00 MF$0.65

DEMONSTRATION REPORT COVERING 1000 VOLT D.C. CHOPPER CONTROL SYSTEM WITH TYPE 1459 MOTORS AND 4160 VOLT - 3 PHASE - 60 CYCLES A.C. VARITRAN CONTROL SYSTEM WITH TYPE 1459-T TANDEM MOTOR UNITS.
Westinghouse Electric Corp., Pittsburgh, Pa. Transportation Div.
For primary bibliographic entry see Field 21C.
PB-175 924 HC$3.00 MF$0.65

PERFORMANCE DEMONSTRATION OF THE ALTERNATING CURRENT PROPULSION SYSTEM.
Allis (Louis) Co., Milwaukee, Wis.
For primary bibliographic entry see Field 21C.
PB-175 936 HC$3.00 MF$0.65

A-C PROPULSION SYSTEM FOR BARTD RAIL CAR APPLICATION.
Garrett Corp., Los Angeles, Calif. AIResearch Mfg. Div.
For primary bibliographic entry see Field 21C.
PB-175 961 HC$3.00 MF$0.65

ELECTRIC, ELECTRONIC FORMULAS. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.
Naval Facilities Engineering Command, Washington, D. C.
Nov 66, 256p NAVFAC P-703.1
Supersedes PB-139 766.

Descriptors: (*Electrical equipment, Maintenance), (*Electronic equipment, Maintenance), (*Maintenance, *Time studies), Performance (Human), Standards, Tables.

The document is comprised of task-time formulas for various electrical and electronic maintenance tasks for use by qualified planner-estimators.
PB-176 052 HC$3.00 MF$0.65

RADAR TEST SET AN/APM-267 (XN-1).
Technical manual calibration procedures.
Naval Air Systems Command, Washington, D. C.
1 Apr 67, 31p NAVAIR-17-20-SEA-2

Descriptors: (*Calibration, *Test sets), Test equipment (Electronics), Instruction manuals, Test methods.

The procedure describes the calibration of Radar Test Set AN/APM-267 (XN-1). (Author)
PB-176 070 HC$3.00 MF$0.65

OSCILLOSCOPES 535, 545 RM-35, RM-45, 945 AN/USM-120 (TEKTRONIX).
Technical manual instrument calibration procedure, VW-12.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
1 Aug 67, 28p
NAVAIR-17-20VW-12

Descriptors: (*Calibration, *Oscilloscopes), Test equipment (Electronics), Instruction manuals, Test methods, Test sets.

Procedure describes the calibration of the Tektronix 535, 545, 945, RM-35, RM-45, or AN/USM-120 oscilloscope which is broadband laboratory oscilloscope with calibrated main sweeps, calibrated delaying sweeps, sweep magnification, a square-wave calibrator, provisions for automatic or adjustable triggering from either internal or external sources, and the necessary power supplies. (Author)
PB-176 116 HC$3.00 MF$0.65

9D. Information Theory

ERROR PERFORMANCE OF DIFFERENTIAL PHASE SHIFT TRANSMISSION OVER A TELEPHONE LINE.

Mitre Corp Bedford Mass
For primary bibliographic entry see Field 17B.
AD-658 437 HC$3.00 MF$0.65

SYLLABLE CODER COMMUNICATION SYSTEM.
RCA Labs Princeton N J
For primary bibliographic entry see Field 17B.
AD-658 530 HC$3.00 MF$0.65

THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD PROCESSING. VOLUME I.
Cook Electric Co Morton Grove Ill
Albert A. Gerlach. Jun 67. 632p
Contract NObsr-77614
See also Volume 2, AD-658 614; Volume 3, AD-658 615. Hard copy available from Cook Electric Co., Morton Grove, Ill.
Availability: Published in Copyrighted journal.

Descriptors: (*Information theory, Statistical analysis), (*Sonar signals, Spectrum signatures), (*Radar signals, Spectrum signatures), (*Spectrum signatures, Detection), Signal-to-noise ratio, Sampling, Coding, Optimization, Targets, Linear systems, Nonlinear systems, Correlation techniques, Adaptive systems.
Identifiers: Wave-period processing.

The book covers in a coherent and unified manner the theory and applications of information processing known to be of importance in signal signature recognition; particularly, as applied to sonar and radar systems. Contents of Volume I include the following: Introduction and summary; Analysis of linear transmission systems; Linear theory of signature recognition; Statistical sampling theory; The stored replica phase-coherence cross-correlator; The adaptive phase-coherence cross-correlator; Wave-period measure and its statistical properties; Coding and processing of wave-period measure.
AD-658 613 Not available from CFSTI.

THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD PROCESSING. VOLUME II,
Cook Electric Co Morton Grove Ill
Albert A. Gerlach. Jun 67. 608p
Contract NObsr-77614
Hard copy available from Cook Electric Co., Morton Grove, Ill. See also Volume 1, AD-658 613; Volume 3, AD-658 615.
Availability: Published in Copyrighted journal.

Descriptors: (*Information theory, Statistical analysis), (*Sonar signals, Spectrum signatures), (*Radar signals, Spectrum signatures), (*Spectrum signatures, Detection), Decision making, Signal-to-noise ratio, Coding, Mathematical models, Magnetic core storage, Targets, Analog systems, Accuracy, Display systems, Control systems.
Identifiers: Wave-period processing.

The book covers in a coherent and unified manner the theory and applications of information processing known to be of importance in signal signature recognition; particularly, as applied to sonar and radar systems. Contents of Volume II include the following: Analysis and experiments in statistical wave-period processing; A model detection processor and its operational characteristics; False target rate and per cent of clutter in detection processors; Design procedures for wave-period detection processors; Automatic target level compensation for wave-period processors; Effects of signature smearing in practical detection processors; Fine-grain statistical wave-period processing; Information storage and display concepts for an active detection system.
AD-658 614 Not available from CFSTI.

THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD PROCESSING. VOLUME III,
Cook Electric Co Morton Grove Ill
Albert A. Gerlach. Jun 67. 568p
Contract NObsr-77614
See also Volume 1, AD-658 613; Volume 2, AD-658 614. Hard copy available from Cook Electric Co., Morton Grove, Ill.
Availability: Published in Copyrighted journal.

Descriptors: (*Information theory, Statistical analysis), (*Sonar signals, Spectrum signatures), (*Radar signals, Spectrum signatures), (*Spectrum signatures, Detection), Graphics, Mathematical models, Signal-to-noise ratio, Decision making, Targets, Probability, Tables.
Identifiers: Wave-period processing.

The book covers in a coherent and unified manner the theory and applications of information processing known to be of importance in signal signature recognition; particularly, as applied to sonar and radar systems. Contents of Volume III include the following: Graphical presentations of model wave-period processor performance characteristics: Tables of model wave-period processor performance and supporting data.
AD-658 615 Not available from CFSTI.

ANALOG SOURCE DIGITIZATION: A COMPARISON OF THEORY AND PRACTICE.
Revised ed.,
Massachusetts Inst of Tech Lexington Lincoln Lab
Thomas J. Goblick, Jr., and Jerome L. Holsinger.
25 Jul 66. 5p Rept no. JA-2646
ESD-TR-67-470
Contract AF 19 (628)-5167
Prepared in cooperation with Defense Research Corp., Santa Barbara, Calif. Revision of manuscript submitted 10 Mar 66.
Availability: Published in IEEE Transactions on Information Theory vIT13 n2 p323-6 Apr 1967.

Descriptors: (*Information theory, *Analog-to-digital converters), Data transmission systems, Data processing systems, Statistical processes, Coding.

The output of an analog source is often converted to digital form for transmission over a noisy channel. Overall communication system efficiency demands that this digitization be done in a manner that minimizes the data rate required to achieve a certain level of fidelity in the waveform reconstructed at the receiver. The information rate of the source with respect to a fidelity criterion provides the minimum of this data rate consistent with the fidelity criterion for any digitization scheme. An analog source is modelled as a stationary, gaussian process with mean squared error as the fidelity criterion. The gaps in performance between some practical digitization systems employing filters, samplers, and quantizers and the theoretical limitations are then calculated. For this model, one is then in a position to judge the worth of these simple digitization schemes and to illustrate explicitly the maximum potential payoff of further research in efficient digitization techniques. (Author)
AD-658 776 Not available from CFSTI.

A CODING THEOREM FOR A CLASS OF UNKNOWN CHANNELS,
Massachusetts Inst of Tech Lexington Lincoln Lab
Irvin G. Stiglitz. 24 Jan 66. 5p Rept no. JA-2750
ESD-TR-67-471
Contract AF 19 (628)-5167
Availability: Published in IEEE Transactions on Information Theory vIT13 n2 p217-20 Apr 1967.

Descriptors: (*Information theory, Coding), Errors, Probability, Communication systems, Design.

The investigation considers the problem of communication over a channel which is selected (1) in a fashion unknown to the communicator, (2) as a function of past history, (3) from a given set of discrete memoryless channels, and (4) for the purpose of maximizing the degradation in performance. An upperbound on error probability insurable with block coding is obtained which exponentially approaches zero with block length for rates less than capacity. Techniques for the communicator to achieve these results are considered. The design of relatively simple communication techniques for channels with memory and jammed channels are discussed. (Author)
AD-658 778 Not available from CFSTI.

CROSSCORRELATION OF A MAXIMAL LENGTH BINARY SEQUENCE AND ITS SUBSEQUENCES.
Rome Air Development Center Griffiss AFB N Y
For primary bibliographic entry see Field 12B.
AD-658 839 HC$3.00 MF$0.65

OPTIMUM LINEAR INTERPOLATION OF SAMPLED FUNCTIONS,
Northeastern Univ Boston Mass Communication Theory Group
For primary bibliographic entry see Field 12B.
AD-658 862 HC$3.00 MF$0.65

SERIES APPROXIMATIONS FOR OPTIMUM ZNL FILTERS,
Princeton Univ N J
A. H. Haddad, J. B. Thomas, and D. S. Kuykendall. 1967. 3p
AROD-5105:19
Contract DA-31-124-ARO (D)-292
Availability: Published in IEEE International Conference on Communication Session 47: Nonlinear Operations, Paper 47.2 19CP67-1143 1967.

Descriptors: (*Electric filters, Optimization), Nonlinear systems, Series, Approximation (Mathematics), Signals, Noise, Information theory, Operations research.

This paper discusses the solution for special realizations of the zero-memory nonlinear filters. (Author)
AD-658 910 Not available from CFSTI.

STATISTICAL COMMUNICATION THEORY FINAL REPORT, 1 DEC. 1963 - 31 MAR. 1967.
Northeastern Univ., Boston, Mass. Communication Theory Group.
For primary bibliographic entry see Field 17B.
For abstract, see STAR 05 21.
N67-35370 HC$3.00 MF$0.65

A COMPARISON OF DECISION SYSTEMS WITH DATA REJECTION.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
J. C. Morakis. Jul 67. 22p NASA-TM-X-55900, X-520-67-360

Descriptors: *Error detecting code, *Signal detection, Code, Convolution, Data, Decision, Detection, Error, Performance, Probability, Rejection, Signal, System.

For abstract, see STAR 05 21.
N67-35916 HC$3.00 MF$0.65

9E. Subsystems

CURRENT DISTRIBUTION AND INPUT ADMITTANCE OF AN ELECTRICALLY THICK TUBULAR ANTENNA DRIVEN BY A VOLTAGE ACROSS A FINITE GAP ON AN INFINITELY LARGE GROUND PLANE,

Harvard Univ Cambridge Mass Cruft Lab
David C. Chang. May 67, 37p Rept no. Scientific-17-Ser-3
AFCRL-67-0377
Contract AF 19 (628)-2406, Grant NSF-GK-273

Descriptors: (*Antennas, Pipes), (*Numerical analysis, Antennas), Integral equations, Electric currents, Distribution, Admittance, Integral transforms.

A new integral equation for the current distribution of an electrically thick tubular antenna which is driven by a voltage across a finite gap on an infinitely large ground plane is formulated. It is found that, in order to describe the experimental model of an antenna driven by a coaxial-line over a ground plane more correctly, an additional source term is required in the conventional integral equation of Hallen's. This term can be expressed explicitly in terms of both the radius of the antenna and the dimension of the gap. A numerical solution of the integral equation has also been obtained by a so-called 'approximate product-integration technique' and the results have been compared with the experimental data. (Author)
AD-658 455 HC$3.00 MF$0.65

AN EXPERIMENTAL STUDY OF AN ELECTRICALLY THICK, TUBULAR, MONOPOLE ANTENNA DRIVEN BY A COAXIAL TRANSMISSION LINE,
Harvard Univ Cambridge Mass Cruft Lab
David C. Chang. Jun 67, 46p Rept no. Scientific-19-Ser-3
AFCRL-67-0406
Contract AF 19 (628)-2406, Grant NSF-GK-273
See also AD-643 862.

Descriptors: (*Antennas, Pipes), Electric currents, Admittance, Distribution, Coaxial cables, Performance (Engineering), Measurement, Ultrahigh frequency.

Current distribution and input admittance of an electrically thick, tubular, monopole antenna driven by a coaxial transmission over a ground plane has been investigated and compared with theoretical results. When the circumference of the antenna is comparable to a free-space wavelength, this experiment verifies that the theoretical model of a tubular dipole antenna with a delta-function excitation only on the outside surface describes the experimental situation more properly than the conventional model of a delta-function excitation on both outside and inside surfaces of the antenna. (Author)
AD-658 456 HC$3.00 MF$0.65

RECIPROCAL AND NONRECIPROCAL MICROSTRIP PERIODIC NETWORKS.
Final rept. 15 Sep 66-15 Jun 67,
Massachusetts Inst of Tech Lexington Lincoln Lab
Jerald A. Weiss. 15 Jul 67, 42p
ESD-TR-67-482
Contract AF 19 (628)-5167, ARPA Order-498
Prepared in cooperation with Worcester Polytechnic Inst., Mass., Dept. of Physics.

Descriptors: (*Networks, Theory), (*Low-pass filters, Microminiaturization (Electronics)), Phase (Electronics), S band, Phase control devices, Ferrites, Wave transmission, Microwaves.

The report presents results of an investigation of a microstrip filter which was designed for the study of nonreciprocal phase in S-band (about 3 GHz). Data are presented showing scattering, absorption, and nonreciprocity. The device is a low-pass 'comb' filter. When matched to less than 1.1/1 VSWR over a 13% band, its insertion loss is 0.8 - 1.2 db. Nonreciprocal differential phase is frequency-sensitive, reaching 30 degrees near the cutoff frequency of 3.5 GHz. An analysis is presented of the theory of periodic networks with sufficient generality to include the nonreciprocal and nonconservative cases. Comparison with the performance of a reciprocal filter shows good agreement. The agreement with nonreciprocal effects is qualitatively correct, although a full treatment of nonreciprocity must await a detailed field theory of propagation on microstrip with a magnetic substrate. The investigation shows that substantial amounts of nonreciprocal phase can be produced by means of a simple, compact, efficient microstrip structure with low loss and good match over an ample band, suitable for control in the 'latching' (remanent) mode of operation. (Author)
AD-658 488 HC$3.00 MF$0.65

INVESTIGATIONS ON THE DIRECTIVITY OF CIRCULAR ANTENNA ARRAYS IN COMPARISON WITH THE BEAMWIDTH OF PARABOLIC REFLECTORS IN THE DECIMETER AND CENTIMETER WAVE BAND.
Final rept.,
Waechtler (Maximilian) Hamburg (Germany)
F. A. Fischer, J. Pietzner, and M. Waechtler.
1966, 152p
Contract AF 61 (514)-736

Descriptors: (*Antenna arrays, Antenna radiation patterns), Radar antennas, West Germany, Rings, Linear systems, Rotation, Measurement, Phased arrays.

Those questions of the research on electronically steerable antennas and circular arrays are discussed, which refer to the problem of suitable antenna arrangements. The required fixed antenna arrangement which has to be a circular array, can only be equivalent with a rotatable parabolic reflector, if the pattern of the circular array has the same directional sharpness and reduction of side lobes as that of a usual parabolic reflector (width of main beam at half-power point circ. 2 degrees and side-lobe level down from peak at least 28 db). The research under this contact results in the data for such a circular array. The investigations required for finding the most suitable dimensions of the antenna system and the necessary amplitude tapering of its aerials, were carried out after considerations about the influence of the laws of tapering on the properties of the directional pattern of rotatable arrays. For these rotatable antenna systems the investigations were made for arrays with discrete aerials as well as for arrays with continuously distributed amplitudes. Because of the required directional sharpness (narrow width of main beam) all antenna systems considered, necessarily have large dimensions and thus a high number of aerials. This fact causes considerable work for the numerical calculation of the patterns. (Author)
AD-658 490 HC$3.00 MF$0.65

SELF-TUNING SYNCHRONOUS FILTER,
Foreign Technology Div Wright-Patterson AFB Ohio
Yu. N. Grekhov. 24 Feb 67, 6p Rept no. FTD-HT-66-724
Unedited rough draft trans. of Patent (USSR) 176 997, appl. 906891/26-9, 18 Jun 64.

Descriptors: (*Electric filters, Correlators), USSR, Patents, Frequency multipliers, Delay lines, Phase shifters, Limiters, Modulators, Amplifiers.

A self-tuning synchronous filter for selecting signals with respect to shape is introduced. It consists of a multiplier, an adder stage, delay lines, phase shifters, and limiting amplifiers. To separate a weak quasiharmonic signal from strong fluctuating background noise and to simplify the multiplier circuit, the latter is designed in the form of two bridge-balanced transistor modulators. (Author)
AD-658 611 HC$3.00 MF$0.65

GAIN OPTIMIZATION FOR ARBITRARY ANTENNA ARRAYS SUBJECT TO RANDOM FLUCTUATIONS,
Syracuse Univ N Y Dept of Electrical Engineering
Fung-I Tseng, and David K. Cheng. Aug 67, 16p Rept no. Scientific-2
AFCRL-67-0489
Contract AF 19 (628)-5668
Availability: Published in IEEE Transactions on Antennas and Propagation vAP15 p356-66 May 1967.

Descriptors: (*Antenna arrays, Gain), Optimization, Antenna radiation patterns, Efficiency.

A general procedure is formulated for the maximization of the expected directive gain for arbitrary antenna arrays whose excitation amplitudes and phases as well as element positions are subject to random errors. Correlations are allowed to exist between the random fluctuations, and the general formulation imposes no restrictions on either the magnitude or the probability distribution of the fluctuations. Numerical examples are given which illustrate the dependence of the expected gain, the main-beam radiation efficiency, the radiation pattern, and the optimum element excitations on the standard deviation and correlation distance of the parameter errors. It is shown that, in typical cases, the properly optimized array yields not only a higher directive gain and a higher main-beam radiation efficiency but also a better radiation pattern than an array which is 'optimized' under the assumption of no random errors. (Author)
AD-658 761 Not available from CFSTI.

EXPERIMENTAL RESULTS OF A FREQUENCY DOUBLER USING A VARACTOR ARRAY,
Massachusetts Inst of Tech Lexington Lincoln Lab
Don Parker, and Alfred I. Grayzel. 3 Apr 67, 3p Rept no. JA-3027
ESD-TR-67-344
Contract AF 19 (628)-5167
Prepared in cooperation with NASA Electronic Research Center, Cambridge, Mass.
Availability: Published in Proceedings of the IEEE v55 n5 p715-6 May 1967.

Descriptors: (*Frequency multipliers, Varactor diodes), Transmission lines, Radiofrequency power.

A varactor frequency doubler was built using a varactor array of two diodes. The varactors were separated by a transmission line one half wavelength long at the fundamental. An output power of twice that achieved with a single diode was obtained at the same efficiency. (Author)
AD-658 769 Not available from CFSTI.

EFFECTS OF PARAMETER QUANTIZATION ON THE POLES OF A DIGITAL FILTER,
Massachusetts Inst of Tech Lexington Lincoln Lab
Charles M. Rader, and Bernard Gold. 23 Feb 67, 3p Rept no. JA-2999
ESD-TR-67-342
Contract AF 19 (628)-5167
Availability: Published in Proceedings of the IEEE v55 n5 p688-9 May 1967.

Descriptors: (*Electric filters, Digital systems), Transfer functions, Configuration, Mathematical logic, Polarization, Noise.

A configuration is proposed which leads to a digital filter that is less sensitive to parameter quantization than are the standard configurations. A few examples illustrate the differences between the various realizations. (Author)
AD-658 784 Not available from CFSTI.

DESIGN OF COMPOSITE MAGNETIC CIRCUITS FOR TEMPERATURE STABILIZATION OF MICROWAVE FERRITE DEVICES.
Revised ed.,

Massachusetts Inst of Tech Lexington Lincoln Lab
Ernest Stern, and William J. Ince. 2 Dec 66, 7p
Rept no. JA-2780
ESD-TR-67-335
Contract AF 19 (628)-5167, ARPA Order-498
Revision of manuscript submitted 10 Jun 66.
Availability: Published in IEEE Transactions on Microwave Theory and Techniques vMTT-15 n5 p295-300 May 1967.

Descriptors: (*Circuits, Microwave equipment), (*Ferrites, Magnetism), Temperature, Stabilization, Ferromagnetic materials, Yttrium compounds, Iron compounds, Garnet, Lithium compounds, Phase shifters, Waveguide circulators, Waveguide switches.

The magnetic flux density of unsaturated microwave ferrites can be made almost constant although microwave ferrite saturation magnetization, coercive force, and hysteresis loop shapes change substantially. Temperature stabilization of flux is achieved by a composite series magnetic circuit consisting of microwave, driver, and flux-limiter ferrites, and a control coil. The flux limiter constrains the circuit flux to an almost constant level throughout the operating temperature range, despite large changes in the size and shape of the microwave ferrite hysteresis loop. The driver ferrite supplies the MMF necessary to sustain the flux. Current impulses in the control coil energize and switch the circuit flux. Estimates of the required lengths and cross-sectional areas of the circuit elements, and of the required switching field and energy for a waveguide remanence phase shifter are given, along with the effects of leakage and fringing fluxes. Composite circuit techniques have been applied to an experimental remanence phase shifter. Unstabilized, a 16 percent loss of phase shift was incurred as a result of an 80C rise in temperature. By applying composite circuit techniques, this value was reduced to less than 2 1/2 percent for the same temperature range. (Author)
AD-658 786 Not available from CFSTI.

CONIC DISPLAY GENERATOR USING MULTIPLYING DIGITAL-ANALOG CONVERTERS.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 9B.
AD-658 796 Not available from CFSTI.

STABILITY OF LINEAR TIME-VARYING NETWORKS,
Rome Air Development Center Griffiss AFB N Y
Robert C. Waag, and Keith R. Kleckner. Aug 67, 21p Rept no. RADC-TR-67-326

Descriptors: (*Networks, Theory), Electrical networks, Stability, Time, Linear systems, Matrix algebra, Transformations (Mathematics).

Using the second method of Liapunov, both long-known and recent stability results are motivated and presented in a logical treatment. First, the necessary and sufficient conditions for stability of the equilibrium for the A-matrix form of the network equations are summarized. Then, sufficient conditions for network stability are found. This is done in two parts. One outlines conditions that follow directly from the parameter matrices of the various network equation formulations. The other indicates conditions obtained via linear transformations. Stability conditions for fixed networks and two-element-kind time-varying networks follow as special cases of this general treatment. The results are interpreted in terms of phase space concepts and restrictions on element pumps. Examples of each of the stability conditions are given and comparisons are made between different techniques for determining network stability. In particular, a case is discussed in which the stability of a network is predicted by the present linear transformation technique but is not predicted by the modified energy function method recently given by Kuhn. (Author)
AD-658 838 HC$3.00 MF$0.65

SELECTIVE ACCESS LASER DISPLAY BEAM POSITIONER.
Hughes Research Labs Malibu Calif
For primary bibliographic entry see Field 20E.
AD-658 840 HC$3.00 MF$0.65

MICROWAVE BREAKDOWN OF THE REENTRY BOUNDARY LAYER.
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 20N.
AD-658 851 HC$3.00 MF$0.65

PERFORMANCE OF ELECTRICALLY SMALL BEAMED ARRAY RECEIVING SYSTEMS IN THE PRESENCE OF NOISE.
Interim rept.,
Syracuse Univ Research Corp N Y Defense Systems Div
Martin Fournier. 1 Jun 67, 87p Rept no. DSD-R-177
Contract Nonr-4798 (00)

Descriptors: (*Antenna arrays, Signal-to-noise ratio), High frequency, Performance (Engineering), Broadband, Noise (Radio), Radiofrequency interference.

The performance of broadband, electrically small beamed receiving arrays operating in the high frequency band (3 to 30 MHz) and in a random noise environment is studied. The concepts of System Noise Figure (SNF) and Signal-to-Noise ratio Improvement Factor (SNIF) are proposed as criteria for comparing one array antenna receiving system to any reference system when the conditions of operation are defined. Graphical representations of SNIF for the two-element and the four-element antenna systems versus a single element system are presented. The improvement factor (SNIF) is shown to depend on the geometry of the array, on the phasing network and on the ratio of atmospheric noise power to internal system noise power. (Author)
AD-658 885 HC$3.00 MF$0.65

WIDE BAND FERRIMAGNETIC LIMITER STUDY.
Interim rept. 1 Mar-24 Jun 67,
Loral Electronic Systems New York
A. Christopher, and J. Moyse. Sep 67, 17p
RADC-TR-67-453
Contract F30602-67-C-0062

Descriptors: (*Limiters, Ferromagnetic materials), Microwave equipment, Yttrium compounds, Iron compounds, Garnet, Band-pass filters, Broadband, Electrical impedance, Phase (Electronics), Phase shifters.

A complete phase analysis of the octave band all pass with electronically tunable limiter ranges is made. Two modes of operation are shown to be possible, an amplitude all pass made with no insertion loss but a 180 degree phase reversal thru the limited interval. The other mode of operation, the phase pass mode, has infinite insertion loss at the edges of the limited interval but no phase reversal. (Author)
AD-658 890 HC$3.00 MF$0.65

HYSTERESIS EVALUATION OF MICROWAVE FERRITES AT AUDIO FREQUENCY WITH LARGE DYNAMIC RANGE.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 11G.
AD-658 899 Not available from CFSTI.

SERIES APPROXIMATIONS FOR OPTIMUM ZNL FILTERS,
Princeton Univ N J
For primary bibliographic entry see Field 9D.
AD-658 910 Not available from CFSTI.

A THEORETICAL STUDY OF THE CONICAL SPIRAL ANTENNA,
Illinois Univ Urbana Antenna Lab
P. W. Klock, and R. Mittra. 1965, 19p
AROD-5405:9
Contract AF 33 (657)-10474, Grant DA-ARO (D)-31-124-G646
Prepared in cooperation with Oxford Univ. (England). Dept. of Science.
Availability: Published in Electromagnetic Wave Theory p751-65 1965.

Descriptors: (*Log periodic antennas, *Spiral antennas), Conical antennas, Helixes, Theory, Numerical analysis, Performance (Engineering).

It is shown that the log-spiral antenna can be analyzed on the basis of the dispersion diagram of its periodic counterpart, the uniform bifilar helix. A WKB solution for the current density distribution is obtained and useful quantitative results are derived on the basis of this solution. The effect of varying the pitch and cone angles are studied. Comparison with experimental results from McClelland and Dyson are shown to be fairly favorable. Some similarities and differences with theoretical results published elsewhere are also brought out. (Author)
AD-658 927 Not available from CFSTI.

QUARTZ FREQUENCY STANDARDS.
Army Electronics Command Fort Monmouth N J Electronic Components Lab
For primary bibliographic entry see Field 9A.
AD-658 936 Not available from CFSTI.

DESIGN TECHNIQUES FOR VHF WIDE-BAND CRYSTAL FILTERS.
Technical rept.,
Army Electronics Command Fort Monmouth N J
Eugene J. Chabak, and Joseph M. Giannotto. Jun 67, 21p Rept no. ECOM-2814

Descriptors: (*Crystal filters, Very high frequency), Broadband, Design, Quartz resonators, Performance (Engineering).

Modern network synthesis techniques have given the design engineer the necessary tools to design filters with optimum performance characteristics. The realization of such designs depends primarily on the availability of components to satisfy the optimum requirements necessary. Wide-band filter designs for VHF operation have been available for some years, however, the realization of these designs became contingent on the improvement of quartz crystal fabrication techniques. The advent of the 'trapped energy' concept has made possible the fabrication of crystal units with enhanced characteristics. Suppression of spurious responses and reduction of crystal resistance now permit the design of wide-band filters in the VHF range. Utilizing a 'stretching' coil technique in half lattice circuit structures, design equations, circuit considerations and parameter values are presented. Filters operating at 68 MHz, required for the RADA program, are analyzed and described in detail to illustrate the theory of design. The report is presented in sufficient detail concerning the design and alignment procedure so that engineering personnel not directly involved with filter design can follow the design theory. (Author)
AD-658 981 HC$3.00 MF$0.65

SHORT INTERACTION CROSSED-FIELD AMPLIFIER.

Quarterly progress rept. no. 4, 1 May-31 May 67,
General Electric Co Schenectady N Y
R. G. Lock. Sep 67, 45p
ECOM-02268-4
Contract DA-28-043-AMC-02268 (E)
See also AD-654 514.

Descriptors: (*Microwave amplifiers, Crossed field devices), Electron beams, Admittance, Vacuum, Circuits, Interactions, Delay lines.

The purpose of this study is to develop a novel, injected-beam, non - re-entrant crossed-field amplifier employing a cycloiding electron beam. Fast bunching of the cycloiding beam occurs since the unfavorably phased electrons are collected on the sole as interaction with the RF field begins. The activity of the fourth quarter centered around testing a cycloiding-beam amplifier in a demountable vacuum enclosure. To date, the testing has mainly been effective in uncovering situations requiring correction in the tube and test equipment. Therefore, a complete evaluation of the amplifier remains to be accomplished, although evidence of the quick bunching of the beam has already been demonstrated. (Author)
AD-658 993 HC$3.00 MF$0.65

C-BAND AND X-BAND DUAL FUNCTION OSCILLATORS.
Quarterly rept. no. 4, 1 Mar-31 May 67,
General Electric Co Owensboro Ky Tube Dept
J. D. Marshall, and J. B. Quirk. Sep 67, 16p
ECOM-02340-4
Contract DA-28-043-AMC-02340 (E)
See also AD-653 154.

Descriptors: (*Oscillators, *C band), (*X band, Oscillators), Triodes, Electron tubes, Frequency modulation, Design, Electrical impedance, Tests, Circuits, Power, Tables.

The triode development phase has continued with major effort now being directed toward X-band operation. The bonded heater-cathode structure is being used exclusively for current investigations. Grid structures still being studied are an interlaced crosswire design and a photoetched support frame design. C-band performance with good power output, I-f frequency, and tuning range has been demonstrated using tubes incorporating the latter named grid structure. This design also provided a 'clean' spectrum with very low frequency modulation. Electrical tests on Oscillator DC-55 were made with very good results. Cross checks between Oscillator DC-55 and Oscillator DC-51 revealed no significant differences. Another oscillator (Oscillator DC-56) was designed and built for the rapid evaluation of tubes. Oscillator DC-56 features spring and finger contacts to the tube in order to facilitate rapid insertion and removal of the tube from the circuit. In the electrical tests of Oscillator DC-55, those tubes which showed little output on the grid excitation test, produced negligible frequency modulation of the r-f output. A check of the effect of load impedance variations was made by introducing a VSWR of 1.5:1 and varying it through all phases. (Author)
AD-659 009 HC$3.00 MF$0.65

A RESETTABLE MONOSTABLE PULSE GENERATOR.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 3B.
For abstract, see STAR 05 21.
N67-36402 HC$3.00 MF$0.65

9F. Telemetry

ABSOLUTE TEMPERATURE MEASUREMENT AT MICROWAVE FREQUENCIES.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
W. E. Brown, III, and G. G. Haroules. Sep 67, 36p NASA-TR-R-271
Contract 125-21-02-26-25

Descriptors: *Dicke type radiometer, *Microwave frequency, *Temperature measurement, Absolute, Calibration, Frequency, Gain, Input, Load, Measurement, Microwave, Performance, Radio, Radiometer, Sky, Stability, System, Temperature, Zero.

For abstract, see STAR 05 21.
N67-35599 HC$3.00 MF$0.65

INPUT ADMITTANCE OF A COAXIAL TRANSMISSION LINE OPENING ONTO A FLAT, DIELECTRIC- COVERED GROUND PLANE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
C. T. Swift. Sep 67, 33p NASA-TN-D-4158
Contract 129-01-03-03-23

Descriptors: *Coaxial cable, *Electromagnetic propagation, *Input, *Slab, Admittance, Antenna, Boundary, Cable, Calculation, Coaxial, Cover, Dielectrics, Electromagnetic, Flat, Ground, Impedance, Problem, Propagation, Surface, Value, Wave.

For abstract, see STAR 05 21.
N67-35734 HC$3.00 MF$0.65

A TURNSTILE CONICAL-SCAN FEED TO IMPROVE TRACKING-ANTENNA PERFORMANCE ON APOLLO INSTRUMENTED SHIPS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
P. A. Lantz. Aug 67, 40p NASA-TM-X-55899, X-525-67-322

Descriptors: *Advanced range instrumentation ship (aris), *Conical scanning, *Feed system, *Telemetry, *Tracking antenna, *Turnstile antenna, Advance, Antenna, Apollo project, Aris, Conical, Coupler, Dipole, Fabrication, Feed, Hybrid, Instrumentation, P-band, Paraboloid, Performance, Range, Reflector, Scanning, Ship, System, Tracking, Turnstile.

For abstract, see STAR 05 21.
N67-35779 HC$3.00 MF$0.65

STUDY AND APPLICATIONS OF RETRODIRECTIVE AND SELF-ADAPTIVE ELECTROMAGNETIC WAVE CONTROLS TO A MARS PROBE QUARTERLY REPORT, 1 JAN. - 31 JUL. 1966.
Stanford Research Inst., Menlo Park, Calif.
C. H. Dawson, and C. A. Hacking. Nov 66, 51p NASA-CR-73120, QR-3
Contract NAS2-2933

Descriptors: *Antenna array, *Modulated continuous wave, *Self-adaptive system, *Spin stabilization, Antenna, Array, Configuration, Continuous, Cylinder, Modulation, Reception, Retrodirecting, Self-adapting, Signal, Spectrum, Spin, Stabilization, System, Transmission, Wave.

For abstract, see STAR 05 21.
N67-36606 HC$3.00 MF$0.65

BISTATIC-RADAR IMAGING AND MEASUREMENT TECHNIQUES FOR THE STUDY OF PLANETARY SURFACES.
Stanford Univ., Calif. Radioscience Lab.
G. L. Tyler, Jr.. May 67, 122p NASA-CR-88284, SEL-67-042
Grant NSG-377

Descriptors: *Imaging technique, *Planetary surface, *Radar astronomy, *Satellite-borne radar, *Surface property, Astronomy, Bistatic, Brightness, Distribution, Experiment, Filter, Imagery, Inversion, Lunar, Map, Orbit, Planetary, Property, Radar, Scattering, Spacecraft, Surface, Technique.

For abstract, see STAR 05 21.
N67-36611 HC$3.00 MF$0.65

10. ENERGY CONVERSION (NON-PROPULSIVE)

10A. Conversion Techniques

P-I-N THERMO-PHOTO-VOLTAIC DIODE,
Purdue Univ Lafayette Ind School of Electrical Engineering
R. J. Schwartz, and C. W. Kim. Aug 67, 133p
Rept no. TR-EE67-13
Contract N00014-67-A-00226-004

Descriptors: (*Photoelectric cells (Semiconductor), *Energy conversion), Photodiodes, Germanium, Manufacturing methods, Semiconductor devices, Measurement, Efficiency.

A p-i-n photovoltaic structure is discussed and compared with a conventional p-n junction photovoltaic converter with respect to the efficiency of conversion. The structure consists of an intrinsic region facing the illumination source with interdigitated p and n regions located on the unilluminated surface. The purpose of using an intrinsic region is to obtain longer lifetimes and diffusion lengths. The heavily doped p and n regions result in larger recoverable voltages and higher open-circuit voltages under high intensity illumination. The use of an evaporation process, with suitable masks, allowed precise control of the dimensions of the interdigitated p-i-n structure and led to the formation of heavily doped junctions. Subsequently a low alloying temperature was used in order to maintain high lifetime in the intrinsic region. It was found that a device fabricated with use of Au-Sb-As for n-type doping, Al for p-type doping, and alloyed at 430C in a gas ambient yielded heavily doped junctions. The p-i-n structure has been analyzed as a two-dimensional boundary value problem under the assumptions of charge neutrality and quasineutrality. The analysis includes calculations of the carrier concentrations generated by photon absorption, the electric field which causes an internal voltage drop in the intrinsic region, and the current dependence of the junction voltage. The solutions are given in terms of elementary functions. The results are obtained in graphical form by means of a computer. It is shown that the area of the p-contacts should be twice as large as that of the n-contacts for an optimum performance. (Author)
AD-658 902 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF HIGH-PERFORMANCE AXIAL-FLOW TURBOMACHINERY. VOLUME I - DESIGN OF TURBINE COMPRESSOR.
Pratt and Whitney Aircraft, East Hartford, Conn.
P. Bolan, R. Cohen, and W. K. Gilroy. Jun 67, 160p NASA-CR-800, PWA-2977, Vol. I
Contract NAS3-4179

Descriptors: *Axial flow compressor, *Brayton cycle, *Power plant, *Turbine, Aerodynamic, Axial, Bearing, Compressor, Design, Dynamic, Flow, Gas, Plant, Power, Rotor, Simulator, Spacecraft, Testing.

For abstract, see STAR 05 21.
N67-35445 HC$3.00 MF$0.65

THEORETICAL PERFORMANCE OF SOLAR CELL SPACE POWER SYSTEMS USING SPECTRAL DISPERSION. II - DISPERSION BY DIFFRACTION GRATINGS.

National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
T. M. Klucher. Sep 67, 25p NASA-TN-D-4157
Contract 120-33-01-10-22

Descriptors: *Diffraction grating, *Energy conversion, *Solar cell, Array, Calculation, Cell, Conversion, Diffraction, Dispersion, Efficiency, Energy, Grating, Increase, Material, Mirror, Multiple, Optics, Power, Semiconductor, Solar, Space.

For abstract, see STAR 05 21.
N67-35759 HC$3.00 MF$0.65

THEORETICAL PERFORMANCE OF SOLAR-CELL SPACE POWER SYSTEMS USING SPECTRAL DISPERSION. I - DISPERSION BY PRISM REFLECTOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A. R. Ratajczak. Sep 67, 26p NASA-TN-D-4156
Contract 120-33-01-10-22

Descriptors: *Energy conversion, *Solar cell, *Spectral reflectance, Array, Calculation, Cell, Conversion, Dispersion, Efficiency, Energy, Increase, Multiple, Optics, Power, Prism, Reflection, Solar, Space, Spectral.

For abstract, see STAR 05 21.
N67-35760 HC$3.00 MF$0.65

AUXILIARY POWER SYSTEMS FOR A LUNAR ROVING VEHICLE.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
E. P. Erlanson. Aug 67, 296p NASA-CR-784, REPT.-66SD4395
Contract NAS3-7627

Descriptors: *Auxiliary power source, *Life support system, *Lunar roving vehicle (lrv), Auxiliary, Brayton cycle, Cabin, Cell, Control, Design, Electric, Engine, Environment, Fuel, Generator, Hydrox, Hypergolic, Integration, Isotope, Life, Lunar, Power, Rankine cycle, Roving, Source, Support, System, Thermal, Thermoelectric, Vehicle.

For abstract, see STAR 05 21.
N67-35793 HC$3.00 MF$0.65

STATIC PARASITIC SPEED CONTROLLER FOR BRAYTON-CYCLE TURBOALTERNATOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 10C.
For abstract, see STAR 05 21.
N67-36012 HC$3.00 MF$0.65

10B. Power Sources

REVERSIBLE OXYGEN ELECTRODES.
Quarterly rept. no. 3, 15 Oct 65-14 Jan 66, Pennsylvania Univ., Philadelphia. Electro-Chemistry Lab.
M. Genshaw, K. Wong, D. Sepa, A. Damjanovic, and E. Gileadi. Apr 66, 24p
ECOM-01291-3
Contract DA-28-043-AMC-01291 (E)
See also AD-628 171.

Descriptors: (*Electrodes, *Fuel cells), (*Cathodes, Fuel cells), (*Catalysts, Fuel cells), Catalysts, Tungsten, Bronze, Oxides, Energy conversion, Stability, pH, Platinum, Salts, Reaction kinetics, Gold, Rhodium, Rotation, Ions, Sodium compounds, Electrolysis, Crystal growth, Density, Graphics, Oxygen, Hydrogen peroxide, Reduction (Chemistry).
Identifiers: Tungsten Bronzes.

The effect of PH in alkaline solution on the oxygen dissolution reaction on platinum was studied. It was found that the salt added to maintain constant ionic strength affects the rate constant for the reduction of H2O2. Complex oxide materials were used as electrodes in O2 reaction. Activity on a group of oxides known as bronzes changes with the composition of the bronze. (Author)
AD-482 902 HC$3.00 MF$0.65

REVERSIBLE OXYGEN ELECTRODES.
Quarterly rept. no. 4, 15 Jan-14 Apr 66, Pennsylvania Univ., Philadelphia. Electro-Chemistry Lab.
K. Wong, D. Sepa, A. Damjanovic, and E. Gileadi. Apr 66, 45p
ECOM-01291-4
Contract DA-28-043-AMC-01291 (E)
See also AD-482 902.

Descriptors: (*Electrodes, *Fuel cells), (*Catalysts, Fuel cells), (*Cathodes, Fuel cells), Electrochemistry, Ions, Reduction (Chemistry), Solutions, Energy conversion, Reaction kinetics, Hydroxides, Catalysts, Tungsten compounds, Oxides, Barium, Cesium, Sulfates, Chlorides, Fluorides, Oxygen, Peroxides.
Identifiers: Tungsten Bronzes.

The rate of electroreduction of oxygen on Pt in alkaline solutions was found to be reduced in the presence of Ba and Cs ions. The effect of the bivalent Ba ions is larger than that of Cs ions. Both ions accelerate the rate of reduction of peroxide ion HO2 to OH ions. Sulfate ions at 0.6 volt accelerate and at 0.2 volt decrease the rate of reduction of HO2 ions. Chloride ions generally decrease the rate, while fluoride ions were found to have essentially no effect in alkaline solutions up to a concentration of 0.1N. A new type of electrode materials, known as bronzes, proved to be fairly active for O2 reduction in acid solutions, particularly at higher pH values (pH = 2). The potential in respect to N.H.E. at a given current density is pH independent. (Author)
AD-489 312 HC$3.00 MF$0.65

ELECTRICAL POWER DISTRIBUTION AT 400Hz TO TACTICAL GROUND UNITS.
Operations analysis technical memo., Tactical Air Command Langley AFB Va
O. E. Hagstrom, and Victor M. Harkavy. Sep 67, 32p Rept no. TAC-OA-TM-131

Descriptors: (*Electric power production, Distribution), Generators, Transmission lines, Efficiency, Feasibility studies, Tactical air command, Transformers, Electric cables, Voltage, Circuit breakers, Military requirements.

A new look at central power plant generation for mobile 400 Hz power utilization is covered in this memorandum. If the distances are not excessive (above 3,000-4,000 ft), the transmission line losses are acceptable and the other advantages of central power generation may be utilized. (Author)
AD-658 444 HC$3.00 MF$0.65

AN ANALYSIS OF LOW ORBITAL DRAG CONSTRAINTS OF ORBIT- AND SUN-ORIENTED SOLAR-CELL ARRAYS,
Air Force Aero Propulsion Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 22B.
AD-658 453 HC$3.00 MF$0.65

SODIUM AMALGAM-OXYGEN FUEL CELL POWER PLANT FOR SUBMARINE APPLICATION: A DESIGN FEASIBILITY STUDY.
Rept. for 20 Jun 62-16 Dec 63,
Kellogg (M W) Co Piscataway N J Research and Development Center
N. Gilbert. 16 Dec 63, 75p Rept no. RD-63-1009

Descriptors: (*Submarines, Power supplies), (*Fuel cells, Feasibility studies), Sodium alloys, Mercury alloys, Oxygen, Specifications, Performance (Engineering), Deep submergence.

A study was undertaken to investigate the feasibility of designing a sodium amalgam-oxygen fuel cell power plant for a small, two-man, deep diving submarine. The scope of the report covers preliminary design studies only which did not include experimental work, design details, or establishment of detailed component specifications. The general specifications included a maximum rated net power output of 1000 kw at 300 volts, a stored energy capacity of 1500 kwh, and the requirement that the plant operate in a flooded compartment. It was concluded that the sodium amalgam-oxygen fuel cell can be designed as a very compact power plant, suitable for operation at depth in a flooded compartment.
AD-659 055 HC$3.00 MF$0.65

REVERSIBLE OXYGEN ELECTRODES.
Quarterly rept. no. 5, 15 Apr-14 Jul 66, Pennsylvania Univ., Philadelphia Electro-Chemistry Lab.
D. Sepa, K. Wong, E. A. Beer, and A. Damjanovic. Oct 66, 155p
ECOM-01291-5
Contract DA-28-043-AMC-01291 (E)
See also AD-489 312.

Descriptors: (*Fuel cells, *Electrodes), (*Cathodes, Fuel cells), (*Catalysts, Fuel cells), Oxygen, Reduction (Chemistry), Electrochemistry, Sulfuric acid, Solutions, Catalysts, Platinum, Tungsten compounds, Oxidation-reduction reactions, Hydrogen peroxide, Chlorides, Iron, Thallium.
Identifiers: Tungsten Bronzes.

The mechanism of oxygen reduction at Pt electrodes in acid (1N and 0.1N H2SO4) solutions is greatly affected by the presence of Cl (-) ions in the solution. The path changed from one in which O2 is reduced to H2O to the path in which O2 is reduced to H2O2. Tungsten bronzes are found to operate also after prolonged polarization. Depolarization of tungsten bronzes after long (20 days) polarization is probably due to residual impurities in the solution. When the solution is changed, the electrode potential for a given current density recovers its initial value. Fe (2+)/Fe (3+) and Tl (+)/Tl (3+) redox couples are considered as possible redox catalysts for oxygen reduction. The rates of electrode reactions for both couples are sufficiently high. (Author)
AD-803 439 HC$3.00 MF$0.65

REVERSIBLE OXYGEN ELECTRODES.
Quarterly rept. no. 6, 15 Jul-14 Oct 66, Pennsylvania Univ., Pa. Electro-Chemistry Lab.
D. Sepa, K. Wong, E. A. Beer, and A. Damjanovic. Feb 67, 152p
ECOM-01291-6
Contract DA-28-043-AMC-01291 (E)
See also AD-803 439.

Descriptors: (*Electrodes, *Fuel cells), (*Cathodes, Fuel cells), (*Catalysts, Fuel cells), Electrochemistry, Reduction (Chemistry), Electrodes, Anodes, Oxygen, Tungsten, Sodium, X rays, Oxidation, Iron, Platinum alloys, Gold alloys, Palladium alloys, Hydrogen peroxide, Rhodium.
Identifiers: Tungsten bronzes.

Tungsten bronzes with different compositions were prepared. The content of sodium in bronzes was determined by X-ray analysis of lattice constants. Activity for oxygen reduction was determined on these bronzes. The exchange current density for oxygen reduction at these bronzes depends on the content of sodium. It changes linearly with x in NaxWO3. However, there are two linear regions of io vs. x. An apparatus was designed to measure the rate of a homogeneous reaction of oxidation by oxygen of a low oxidized form of a redox system. In this apparatus, the change of the vo-

lume of the gas with time is measured. The rate of constant for oxidation of Fe++ at 27.5C is 0.00000014/sec. From the rate measurements at different temperatures the activation energy for the reaction is 5.8 kcal/mole. (Author)
AD-810 816 HC$3.00 MF$0.65

REVERSIBLE OXYGEN ELECTRODES.
Quarterly rept. no. 7, 15 Oct 66-14 Jan 67,
Pennsylvania Univ., Philadelphia. Electro-Chemistry Lab.
D. Sepa, Y. C. Chiu, E. A. Beer, and M. Genshaw. Apr 67, 28p
ECOM-01291-7
Contract DA-28-043-AMC-01291 (E)
See also AD-810 816.

Descriptors: (*Fuel cells, *Electrodes), (*Catalysts, Fuel cells), (*Cathodes, Fuel cells), Oxidation-reduction reactions, Catalysis, Oxygen, Iodides, Oxidation, Tungsten compounds, Oxides, Reaction kinetics, Ions, Adsorption, Solutions.
Identifiers: Tungsten bronzes.

Small crystals of lithium, potassium and cesium tungsten bronzes were prepared. Also nonstoichiometric gamma-tungsten trioxide was prepared. To study the catalytic activity of these bronzes a method of sintering them into gold was devised. The homogeneous oxidation of iodide by oxygen was studied. The rate constant at 25 degrees is 0.00004/sec. The reaction is first order in oxygen and zero order in iodide and hydrogen ions. The activation energy is 16.9 kcal/mole. A very sensitive method of determining ion adsorption utilizing multiple reflection ellipsometry is suggested. (Author)
AD-814 722 HC$3.00 MF$0.65

SOLAR THERMIONIC GENERATOR DEVELOPMENT QUARTERLY REPORT, MAR. 1 - JUN. 7, 1967.
Thermo Electron Engineering Corp., Waltham, Mass.
Jun 67, 41p NASA-CR-88013, TE-4055-123-6723-67
Contracts NAS7-100, JPL-951263
Prepared for Jpl

Descriptors: *Energy converter, *Solar generator, *Thermionic converter, Collector, Converter, Current, Electrode, Energy, Fabrication, Generator, Heat transfer, Output, Performance, Solar, Testing, Thermionic.

For abstract, see STAR 05 21.
N67-35553 HC$3.00 MF$0.65

10C. Energy Storage

REFRACTOMETRIC SENSING OF H2SO4 SPECIFIC GRAVITY IN LEAD-ACID CELL OPERATION,
Naval Research Lab Washington D C
Jeanne Burbank. 5 Jul 67, 16p Rept no. NRL-6562

Descriptors: (*Storage batteries, Test methods), (*Refractometers, Operation), Sulfuric acid, Density, Refractive index, Electrolytes, Sensors.
Identifiers: Lead-acid cells, Specific gravity.

A simple inexpensive dipping refractometer for continuous automatic monitoring of the refractive index of fluids was used to record the changes in electrolyte specific gravity during cycling of a lead-acid cell. It introduces no contamination, is durable, and minimizes test sampling and personal attendance. It may be adapted for automatic control systems and can be operated as a level indicator. (Author)
AD-658 747 HC$3.00 MF$0.65

SEPARATOR DEVELOPMENT FOR A HEAT STERILIZABLE BATTERY QUARTERLY REPORT, JAN. 1 - MAR. 31, 1967.
Westinghouse Electric Corp., Pittsburgh, Pa. Research Labs.
R. G. Charles, A. Langer, and C. R. Ruffing. 31 Mar 67, 82p NASA-CR-88014, REPT.-67-9B6-BSEPA-R1
Contracts NAS7-100, JPL-951525
Prepared for Jpl

Descriptors: *Filter, *Pressure effect, *Silver-zinc battery, *Sterilization, Battery, Coating, Effect, Filler, Film, Heat, Inorganic, Pressure, Separator, Silver, Zinc.

For abstract, see STAR 05 21.
N67-35534 HC$3.00 MF$0.65

STATIC PARASITIC SPEED CONTROLLER FOR BRAYTON-CYCLE TURBOALTERNATOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. L. Fischer, B. D. Ingle, and J. L. Word. Sep 67, 23p NASA-TN-D-4176
Contract 120-27-03-42-22

Descriptors: *Brayton cycle, *Speed regulation, *Turboalternator, Channel, Conversion, Energy, Flow, Gas, Loading, Loss, Model, Regulation, Silicon, Solar, Speed, Static.

For abstract, see STAR 05 21.
N67-36012 HC$3.00 MF$0.65

11. MATERIALS

11B. Ceramics, Refractories, and Glasses

ANALYSIS OF MECHANICAL TESTING PROCEDURE FOR BRITTLE MATERIALS.
IIT Research Inst Chicago Ill
For primary bibliographic entry see Field 20K.
AD-658 695 HC$3.00 MF$0.65

HIGH-TEMPERATURE ELASTICITY AND EXPANSIVITY OF FORSTERITE AND STEATITE.
Revised ed.,
Land-Air Inc Holloman N Mex
Naohiro Soga, and Orson L. Anderson. 12 Dec 66, 4p Rept no. Contrib-1040
Grant NSF-GP-4437
Revision of manuscript submitted 5 Sep 66.
Availability: Published in Journal of the American Ceramic Society v50 n5 p239-42 May 1967.

Descriptors: (*Magnesium compounds, High-temperature research), (*Silicates, High-temperature research), Elasticity, Thermal expansion, Modulus of elasticity, Shear stresses, Thermal properties.
Identifiers: Forsterite, Steatite.

The elastic constants and coefficients of thermal expansion of polycrystalline forsterite (Mg_2SiO_4) and steatite ($MgSiO_3$) were determined from room temperature to 1000K. Two elastic moduli, the adiabatic bulk modulus, Bs, and the shear modulus, G, decrease linearly with temperature above 500K. The Gruneisen constant gamma and a parameter delta, defined as - (dBs/dT)/alpha-Bs, calculated from the present data were virtually independent of temperature at the high-temperature range. Poisson's ratio, sigma, rises linearly with temperature over the range of measurement; the slope is highest for materials with the lowest room-temperature value of sigma. (Author)
AD-658 701 Not available from CFSTI.

CEMENT PERFORMANCE IN CONCRETE.
Technical rept.,
Army Engineer Waterways Experiment Station Vicksburg Miss
Bryant Mather. Sep 67, 84p Rept no. AEWES-TR-6-787
Availability: Hard copy available from Army Engineer Waterways Experiment Station, Vicksburg, Miss., $1.00.

Descriptors: (*Cements, Performance (Engineering)), (*Concrete, Performance (Engineering)), Chemical analysis, Heat of reaction, Aging (Materials), Fracture (Mechanics), Permeability.

Samples of 22 portland cements, consisting of types I, II, III, IV, and V from various sources, all of which had been studied by the Portland Cement Association (PCA) in its Long-Time Study of Cement Performance in Concrete (LTS) were furnished by PCA to the Waterways Experiment Station (WES) for testing. The purpose of the tests was to develop performance data on the different types of cement and, when possible, to compare the data developed with those obtained by PCA. A sample of each cement was sieved to determine the percentage of lumps formed during 10 years storage, and was then subjected to chemical analysis, physical tests, and heat of hydration tests. Air-entrained concrete mixtures were proportioned with each cement. Specimens were made for test in the freshly mixed and hardened condition. The effects of 10-year storage were found to be negligible. In general, test results compared well with those of PCA. Analysis of data on sulfate resistance and cracking resistance were made since these test methods had not previously been used in the LTS program. It was indicated that results of these two tests are influenced not only by the characteristics of the cement that might be expected to affect such performance, but also by the rate of reaction of the cement with water to develop hydration products and by strength and related attributes. (Author)
AD-658 732 MF$0.65

EFFECTS OF REACTIVE CARBONATE AGGREGATES ON THE DURABILITY OF LABORATORY CONCRETE SPECIMENS.
Missouri State Highway Dept. Div. of Materials and Research.
Jul 67, 51p Rept. no. 67-5
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, *Carbonate minerals), (*Chemical reactions, Carbonate minerals), Cements, Environmental tests, Laboratories, Storage, Chemical properties, Flexural strength, Particle size, Beams (Structural), Tables.
Identifiers: Aggregates (Materials).

The objectives of this study were to determine: the relationship between the expansion of carbonate rock prisms in 1 N NaOH and the expansion of concrete made with these carbonate rocks in various environments and with cement of various alkali contents, the reduction in expansion on replacing 20 percent of the cement with fly ash. From the work, it was found that: expansion of concrete tends to be directly related to expansion of the rock prisms, the alkali content of the cement, the environment to which the concrete is subjected, the length of the test period. Storage of the concretes containing reactive carbonate rocks in 4 percent NaCl solution significantly increased expansion. The use of fly ash in concrete decreased expansion only slightly. (Author)
PB-175 951 HC$3.00 MF$0.65

ALKALI REACTIVITY OF CARBONATE ROCKS IN MISSOURI.
Missouri State Highway Dept. Div. of Materials and Research.
Aug 67, 42p Rept. no. 67-6

Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Carbonate minerals, *Concrete), (*Chemical reactions, Carbonate minerals), Laboratories, Cements, Environmental tests, Sampling, Particle size, Rock (Geology), Chemical analysis, Tables.
Identifiers: Aggregates (Materials).

The purpose of this study was to correlate the expansion of carbonate rock prisms with the location and composition of the concrete aggregates by means of the standard rock prism test. It was found that neither the percent acid insoluble or the percent dolomite in the carbonate fraction are reliable indicators for detecting reactive aggregates. (Author)
PB-175 952 HC$3.00 MF$0.65

AN EVALUATION OF TERMINAL ANCHORAGE INSTALLATIONS ON RIGID PAVEMENTS.
Texas Highway Dept. Highway Design Div.
For primary bibliographic entry see Field 13B.
PB-176 064 HC$3.00 MF$0.65

PERFORMANCE OF COMPOSITE LIGHTWEIGHT CONCRETE DECKS ON STEEL STRINGERS,
Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
For primary bibliographic entry see Field 13M.
PB-176 067 HC$3.00 MF$0.65

A COMPARISON OF 1-1/2-INCH AND 3/4-INCH MAXIMUM SIZE AGGREGATE IN CONCRETE.
Research rept.,
California State Div. of Highways. Materials and Research Dept.
Donald L. Spellman, Wallace H. Ames, James H. Woodstrom, and Carl R. Sundquist. Jul 67, 32p
M/R-635148-2
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, Pavements), Compressive properties, Drying, Shrinkage, Cracks, Measurement, Aging (Materials).
Identifiers: Aggregates (Materials).

Concrete was made from aggregate obtained from nine aggregate sources located through California. Concretes containing 1 1/2-inch and 3/4-inch maximum size aggregate at cement contents of 6 and 7 1/2 sacks per cubic yard were compared. Each concrete was tested primarily for compressive strength and drying shrinkage. In addition, some aggregate tests were made prior to using the aggregate in concrete, and tests were made to determine physical properties of the fresh concrete. Test results indicated that concrete made with 1 1/2-inch aggregate generally has lower drying shrinkage, lower water-cement ratio, higher density, and less entrapped air than that made with 3/4-inch aggregate. Compressive strength was shown to be dependent on individual aggregate characteristics, cement contents, and age. The variation in drying shrinkage of concrete made from the nine aggregate sources is much greater than that attributed to variation of maximum aggregate size. It is concluded that where strength and shrinkage are important factors, each case must be considered individually when deciding whether to use 3/4-inch or 1 1/2-inch maximum size. (Author)
PB-176 101 HC$3.00 MF$0.65

FLEXURAL FATIGUE DURABILITY OF SELECTED UNREINFORCED STRUCTURAL LIGHTWEIGHT CONCRETES.
Research rept.,
Texas Transportation Inst., College Station.
J. C. Chakrabarti, and W. B. Ledbetter. Jul 67, 24p RR-81-4
Research supported in part by Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, *Fatigue (Mechanics)), Stresses, Flexural strength, Moisture, Aging (Materials), Freezing, Tests, Texas.
Identifiers: Aggregates (Materials).

In the research study, the fatigue durability of concrete was reviewed, a reproducible flexural fatigue test was developed, and the flexural fatigue durability of selected unreinforced structural lightweight concretes was determined. Also, relationships between flexural fatigue durability and freeze-thaw durability of selected concretes were established. Fatigue tests were conducted on unreinforced prisms of three lightweight concretes and one regular weight concrete. Two of the lightweight concretes and the regular weight concrete were tested in a moist condition, and one lightweight concrete was tested in a dry condition. In the fatigue tests, all specimens were subjected to repeated sinusoidal stress cycles at the rate of 697 cpm. The fatigue stress levels were determined as a percentage moduli of rupture of identical prisms. All concretes were cured for a minimum period of 28 days prior to testing. Following are the important conclusions that were derived from this research: The resistance of unreinforced structural concrete to flexural repeated load was dependent on the applied stress amplitude, the variation of the log of the fatigue life being inversely proportional to the applied stress up to 10 million repetitions of the load for all the concretes tested. Type of coarse lightweight aggregate definitely affected the flexural fatigue behavior of unreinforced structural concrete. Dry concrete exhibited longer fatigue life than wet concrete. A relationship was found to exist between fatigue durability and freeze-thaw durability for the conditions of this study. (Author)
PB-176 104 HC$3.00 MF$0.65

11C. Coating, Colorants, and Finishes

TEST OF NON-SKID PAINT ON TANKS,
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch. 3 Jun 44, 2p

Descriptors: (*Paints, *Tanks (Combat vehicles)), Safety, Hazards, Skidding.
Identifiers: Non-skid paint.

The non-skid paint provides an improved walking surface when dry and free from a dirt layer. The non-skid paint surface insures an improved footing in the rain, provided the surface is free from mud and shoes are clean. The non-skid quality of the paint is rapidly lost with accumulation of mud on the tank, owing to the fact that the projecting mineral particles are covered by the mud layer. Accumulation of mud on the shoes also effectively destroys the usefulness of the paint. The non-skid paint was observed to increase the slipping hazard when the tank was partially coated with mud. This is explained by the fact that when suddenly stepping onto the slippery muddy surface from the clean non-skid surface, one is unprepared for the loss of footing. In view of the fact that a non-skid surface is particularly desired in muddy operations, the subject paint has little practical usefulness. (Author)
AD-658 626 HC$3.00 MF$0.65

TREATMENT OF MESS KITS TO REMOVE GLARE,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 627 HC$3.00 MF$0.65

INFRARED AND GAS CHROMATOGRAPHIC STUDIES OF MAGNET-WIRE ENAMELS.
Technical note,
Naval Ship Research and Development Center
Annapolis Md Annapolis Div
M. Greenberg, and E. H. Halpern. Sep 67, 28p
NSRDC-146/67

Descriptors: (*Electric insulation, Quantitative analysis), (*Plastic coatings, Quantitative analysis), Magnetic materials, Wire, Infrared spectroscopy, Gas chromatography, Polyamide plastics, Vinyl plastics, Solvents, Aging (Materials), Molecular structure.

Quantitative methods were developed for measuring performance related characteristics of magnet-wire enamels such as residual-solvent content, degree of conversion upon curing, and changes in molecular structure with thermal aging. Results of both infrared absorption and gas chromatographic studies of cured and thermal aged polyimide and Formvar resin enamels are reported. Sample preparation techniques are described. Correlations are made with standard performance tests such as weight loss on heating and breakdown voltage. (Author)
AD-658 724 HC$3.00 MF$0.65

EFFECTS OF A SIMULATED SPACE ENVIRONMENT ON THERMAL RADIATION CHARACTERISTICS OF SELECTED BLACK COATINGS.
National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.
D. J. Progar, and W. R. Wade. Sep 67, 66p
NASA-TN-D-4116
Contract 124-09-18-05-23

Descriptors: *Protective coating, *Space environment, *Thermal radiation, Aluminum, Bismuth, Black, Coating, Cobalt, Effect, Environment, Lead, Nickel, Protection, Radiation, Simulation, Space, Spacecraft, Steel, Sulfide, Thermal.

For abstract, see STAR 05 21.
N67-35729 HC$3.00 MF$0.65

DEVELOPMENT OF PHASE-CHANGE COATINGS FOR USE AS VARIABLE THERMAL CONTROL SURFACES FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 21.
N67-36080 HC$3.00 MF$0.65

DEVELOPMENT OF COATINGS FOR TANTALUM ALLOY NOZZLE VANES FINAL REPORT, 1 MAY 1965 - 31 JAN. 1967.
Solar, San Diego, Calif.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 21.
N67-36159 HC$3.00 MF$0.65

AIR-DRYING BEHAVIOUR OF POLES AND POSTS OF EUCALYPTUS VIMINALIS,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Forest Products.
For primary bibliographic entry see Field 11L.
PB-176 061 HC$3.00 MF$0.65

11D. Composite Materials

FIRST ANNUAL PROJECT REVIEW AND TECHNICAL REPORT 30 JUNE 1965-30 APRIL 1966,
Monsanto Research Corp., St. Louis, Mo.
John D. Calfee. 5 Aug 66, 99p HPC-66-13
Contract N00014-66-C-0045
Prepared in cooperation with Washington Univ., St. Louis, Mo. Rept. on proj. High-Performance Composites.

Descriptors: (*Composite materials, Reviews), Research program administration, Performance

(Engineering), Thickness, Elasticity, Mathematical analysis, Stresses, Fatigue (Mechanics), Reinforcing materials, Fibers, Material forming, Bonding, Density, Environment, Stability, Dyes, Casting, Molding, Aging (Materials), Model tests, Reinforced plastics, Whiskers (Crystals).

Mathematical analyses were developed making it possible for the first time to calculate stress patterns of multiple interacting cracks; a technique found for measuring the rate of water diffusion along a glass-resin interface which provided strong evidence that diffusion can be very small; thick interfaces shown to change the stress concentration and stress pattern at resin-glass interfaces. In research on fibers and fabrication, commercially available short fibers and whiskers were characterized to provide guidance in selection of fibers for fabrication studies. In education, a graduate course composite materials was conducted for project scientists and students in materials science. In communication a computerized research index system was established to provide rapid retrieval of information in the literature.
AD-487 208 HC$3.00 MF$0.65

SILICON CARBIDE FILAMENT REINFORCED EPOXY RESIN COMPOSITES.
Rept. for May-Aug 66,
Air Force Materials Lab Wright-Patterson AFB Ohio
H. P. Materne, and R. J. Kuhbander. May 67, 20p Rept no. AFML-TR-66-383

Descriptors: (*Reinforced plastics, Mechanical properties), (*Epoxy plastics, Reinforcing materials), (*Silicon carbides, Reinforced plastics), Filaments, Preparation, Tensile properties, Modulus of elasticity, Surface properties, Flexural strength, Shear stresses, Compressive properties.

A series of composites were prepared with a nominal 4-mil diameter silicon carbide monofilament in an epoxy resin matrix. The average tensile strength of the silicon carbide filament was 360,000 psi and the average modulus of elasticity 61,000,000 psi. The filaments were prepared by the chemical vapor process using 0.5-mil diameter tungsten as a substrate. Filament characterization consisted of mechanical, physical, and morphological property evaluation. Composite fabrication was achieved by preparing preimpregnated and B-staged monolayer tapes for plying into unidirectional and balanced bidirectional composites. Composite evaluation consisted of tensile, flexure, shear and compressive strength, and moduli determinations. Unidirectional composites, containing 62 volume-percent filament, exhibited an average flexural strength of 260,000 psi and an average flexural modulus of 33,400,000 psi. These evaluations have permitted the preliminary assessment of the capability of silicon carbide as a potentially high performance reinforcing filament. (Author)
AD-658 443 HC$3.00 MF$0.65

SECOND ANNUAL PROJECT REVIEW AND TECHNICAL REPORT 1 MAY 1966-30 APRIL 1967,
Monsanto Research Corp St Louis Mo
John D. Calfee. 12 Jul 67, 258p Rept no. HPC-67-28
Contract N00014-67-C-0218, ARPA Order-873
Report on Monsanta/Washington Univ., ARPA Association Project Development of High Performance Composites. See also AD-487 208.

Descriptors: (*Composite materials, Reviews), Mechanical properties, Reinforcing materials, Fibers, Cracks, Modulus of elasticity, Laminates, Fracture (Mechanics), Electron microscopy, Acrylic resins, Zinc compounds, Oxides, Silanes, Crack propagation, Whiskers (Crystals), Boron, X-ray diffraction analysis, Material forming.

The finite-element method was used to calculate the longitudinal stiffness of short fiber composites; the instability of parallel edge cracks determined from the energy concept and the strength and inherent crack size obtained from the stability calculations; Young's modulus calculated for randomly oriented fibrous composites; a mathematical approach proposed for calculating stress fields around interior cracks; and invariant properties of a laminated composite derived from the transformation equations of the anisotropic moduli. The electron scanning microscope provided insight into fracture mechanics; composites were improved by incorporating a flexible layer around the fiber; polyacrylic acid reacted with ZnO to produce a high modulus, temperature-resistant matrix; data obtained indicating silane couplers decrease water diffusion at the interface; a decrease in fracture toughness associated with a change in crack propagation mechanism; and the viscosity of aggregate suspensions described by the Mooney equation. Techniques were developed for whisker fiber classification; strands of well-oriented whisker fibers made and fabricated into high performance composites; x-ray diffraction techniques applied to measuring fiber orientation, property maps developed for short fiber composites; short boron fibers encapsulated to make a pre-preg molding compound in bead form; fiber-matrix dry mix molding explored; and data obtained relating matrix properties to fatigue characteristics.
AD-658 533 HC$3.00 MF$0.65

HIGH MODULUS, HIGH STRENGTH FILAMENTS AND COMPOSITES.
Technical rept. 1 Oct 64-15 Apr 66,
Astro Research Corp Santa Barbara Calif
Robert M. Witucki. May 67, 146p Rept no. ARC-R-213
AFML-TR-66-187
Contract AF 33 (615)-2177

Descriptors: (*Composite materials, Boron), (*Boron, *Filaments), Fibers (Synthetic), Wire, Tungsten, Vapor plating, Stresses, Strain (Mechanics), Cracks, Creep, Thermal expansion, Etching, X-ray diffraction analysis, Interfaces.

The presence of internal stresses in boron filaments was inferred from experiments showing strain relief. In addition, measurements were made of the change in tungsten substrate length occurring during boron filament fabrication of the thermal expansion of boron filament to 1030C, and of the creep rate at 1070C. A model for filament formation is proposed in which the first significant step in filament fabrication is the formation of a continuous boron sheath around the tungsten substrate. Subsequent reaction between the boron sheath and the tungsten substrate results in the formation of tungsten borides at the interface having specific volumes much less than that of the reactants. Residual internal stresses present in boron filaments arise from three principal sources. These include core volume changes during filament fabrication, differential thermal contraction between the boron sheath and the core on cooling from filament formation temperature, and stresses in the boron sheath inherent in the vapor deposition process. Stresses were calculated for a selected filament from analysis, and values given for the filament surface, for the core interface, and for the core.
AD-658 872 HC$3.00 MF$0.65

ELECTRICAL RESISTIVITY OF BORON FIBERS,
Boeing Scientific Research Labs Seattle Wash
Solid State Physics Lab
R. F. Deacon. Aug 67, 21p Rept no. D1-82-0642

Descriptors: (*Boron, *Fibers (Synthetic)), Composite materials, Filaments, Resistance (Electrical), Wire, Tungsten, Silicon dioxide, Carbon fibers, Electric connectors.

The D. C. overall resistivities of composite filaments composed of boron deposited on a conducting wire core, vary from 2600 micro-ohms cm for tungsten core to 8.5 ohms cm for silica/carbon core. The contact resistance, which is large, of the tungsten material is very sensitive to contact length because of the high resistance of the boron sheath, and is described to a first order by the equation derived in the paper. Doping the boron to reduce its resistance would improve this situation.
AD-658 896 HC$3.00 MF$0.65

PLANETARY VEHICLE THERMAL INSULATION SYSTEMS, PHASE I SUMMARY REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
S. J. Babjack, R. W. Carr, A. D. Cohen, L. V. Dudley, and C. S. Lankton. 3 Mar 67, 195p NASA-CR-88009, DOC.-67SD4289
Contract JPL-951537

Descriptors: *Planetary spacecraft, *Space simulation, *Thermal insulation, Absorption, Conductivity, Emission, Exposure, Heat, Insulation, Material, Planetary, Radiation, Requirement, Simulation, Solar, Space, Spacecraft, System, Testing, Thermal.

For abstract, see STAR 05 21.
N67-35552 HC$3.00 MF$0.65

COLLOIDAL ASBESTOS FIBRILS AS REINFORCEMENTS FOR POLYMERIC STRUCTURES.
Gillette Research Inst., Inc., Washington, D. C.
C. A. Rader, and A. M. Schwartz. Sep 67, 29p
NASA-CR-893
Contract NASW-1420

Descriptors: *Asbestos, *Polymer, *Reinforcing fiber, Bond, Chemical, Colloid, Composite, Dispersion, Fiber, Ice, Matrix, Reinforcement, Resin, Strength, Structure.

For abstract, see STAR 05 21.
N67-36014 HC$3.00 MF$0.65

11E. Fibers and Textiles

BIAXIAL TENSILE TESTER FOR FABRICS.
Technical rept.,
Fabric Research Labs Inc Dedham Mass
R. E. Sebring, and W. D. Freeston, Jr. May 67, 117p
USA-NLABS-TR-67-71-GP
Contract DA-19-129-AMC-1042 (N)

Descriptors: (*Textiles, Test equipment), (*Test equipment, Tensile properties), Strain (Mechanics), Tents, Design, Performance (Engineering), Coatings, Army equipment, Air Force equipment.

The overall goal of the program is the development of an instrument for determining the stress-strain response of coated fabrics used in the construction of air-supported tents. During Phase I of the program a survey of the scientific literature on biaxial tensile testers was carried out. The purpose of the survey was to examine the design features and operating techniques of previously constructed testers and to note design innovations and shortcomings. A theoretical analysis of the load-extension behavior of idealized plain-weave fabrics subjected to biaxial stresses is presented. Fabric strains resulting from both crimp interchange and yarn extension are considered. The analtyical expressions derived have been solved with the aid of a digital computer for both linearly elastic and elasto-plastic materials. Time effects, although not explicitly included, are discussed. Generalized plots of the results are given for the two extremes of initial fabric structure: (1) equal crimp distribution in both sets of yarns; (2) one set of yarns straight (noncrimped). The predicted and measured response of two model fabrics are compared. Two

typical coated fabrics representing approximately the extremes in fabric weight and strength currently of interest for air-supported tent applications were evaluated. The design of an improved biaxial tensile tester is outlined. The proposed design concept utilizes the results of the literature survey, model fabric study and coated fabric evaluation. (Author)
AD-658 684 HC$3.00 MF$0.65

STRESS-STRAIN RESPONSE OF FABRICS UNDER TWO-DIMENSIONAL LOADING.
Technical rept.,
Air Force Materials Lab Wright-Patterson AFB Ohio
W. Denney Freeston, Jr., Milton M. Platt, and Meredith M. Schoppee. Jul 67, 92p Rept no. AFML-TR-67-44

Descriptors: (*Textiles, Loading (Mechanics)), Stresses, Strain (Mechanics), Fibers, Tensile properties, Poissons ratio, Deformation, Elasticity.

A theoretical analysis of the load-elongation behavior of idealized plain-weave fabrics subjected to biaxial stresses is presented. Fabric strains resulting from both crimp interchange and yarn extension are considered. The analytical expressions derived have been solved with the aid of a digital computer for both linearly elastic and elasto-plastic materials. Time effects, although not explicitly included, are discussed. Generalized plots of the results are presented for the two extremes of initial fabric structure: (1) equal crimp distribution in both sets of yarns; (2) one set of yarns non-crimped-straight. The predicted and measured response of model fabrics are compared. (Author)
AD-658 870 HC$3.00 MF$0.65

COMBUSTIBILITY TESTS ON SEVERAL FLAME-RESISTANT FABRICS IN COMPRESSED AIR, OXYGEN-ENRICHED AIR, AND PURE OXYGEN,
Union Carbide Corp Tonawanda N Y Linde Div
Gerhard A. Cook, Robert E. Meierer, and Bruce M. Shields. 24 Jan 67, 9p
Availability: Published in Textile Research Journal v37 n7 p591-9 Jul 1967.

Descriptors: (*Fire resistant textiles, Flammability), (*Confined environments, *Fire safety), (*Glass textiles, Fire resistant textiles), (*Halocarbon plastics, Fire resistant textiles), Woolen textiles, Oxygen, Compressed air, Air, Closed ecological systems, Combustion, Burning rate, Tests, Nylon, Cotton.

The safest material is Beta Fiberglas, which showed no signs of ignition or combustion under any conditions. Next safest is Teflon. Teflon cloth was found to be self-extinguishing at all pressures tested in air enriched to 31% oxygen. In 41% oxygen and in pure oxygen, at the lower subatmospheric pressures, Teflon burned slowly. Both Roxel cotton and Nomex are safer than untreated cotton in compressed air; Nomex has the additional advantages that it burns only at a low rate in air enriched to 25% oxygen, and that its high ignition temperature is not much reduced at higher pressures, at least in air. Roxel has the advantages that it apparently absorbs body moisture more readily than does Nomex, and that it does not present a problem with static electricity. Wool burns more slowly than untreated cotton in compressed air, and its ignition temperature stays high as the pressure is increased. (Author)
AD-658 953 Not available from CFSTI.

11F. Metallurgy and Metallography

DELAYED FRACTURE OF TITANIUM ALLOYS,
Redstone Scientific Information Center Redstone Arsenal Ala Translation Branch
M. Kh Shorshorov, and V. N. Meshcheryakov.
28 Aug 67, 20p
RSIC-689, TT-67-62919
Trans. of mono. Novye Issledovaniya Titanovykh Splavov, n.p., 1965 p278-88.

Descriptors: (*Titanium alloys, *Fracture (Mechanics)), Deformation, Aging (Materials), Cracks, Creep, Aluminum alloys, Zirconium alloys, Brittleness, Microstructure, Stresses.

Results of delayed-fracture tests on an IMET-4 machine for VT6S, VT6, and VT14M Ti alloys, for a Ti alloy with low Al and Zr content, and for a Ti alloy with 3.7-percent Al. The fracture behavior and brittle properties of these alloys are compared. The mechanism involved is discussed noting the role of intergrain forces and absorbed gases. (Author)
AD-658 670 HC$3.00 MF$0.65

PROPERTIES OF SEVERAL STRUCTURAL U-Mo-Cb-V-Ti ALLOYS.
Technical rept.,
Army Materials Research Agency Watertown Mass
Stanley M. Wolf, and F. J. Rizzitano. Jun 67, 24p Rept no. AMRA-TR-67-18

Descriptors: (*Uranium alloys, *Corrosion resistance), (*Heat treatment, Structural properties), Vanadium, Titanium, Molybdenum, Niobium, Microstructure, Extrusion, Aging (Materials).

Metallurgical properties of twelve alpha-gamma uranium alloys based on the composition U-Mo-Cb-V-Ti (alloying elements varied from 1/8 to 4-1/2 weight percent), including the corrosion resistance of three of these alloys, were determined for various heat treatments and related to the metallographic structure after heat treatment. In general, tensile ductility and impact energy were increased at constant tensile strength levels for material extruded, solutionized, and isothermally transformed rather than extruded and aged. Grain size was considerably enlarged and chemical homogeneity improved by the solutionized heat treatment. The properties of these alloys were compared with the U-2Mo-2Cb-2Zr-1/2Ti alloy developed previously. Substituting vanadium for zirconium raised the ductility and lowered the strength of these alloys. Corrosion resistance in boiling water at atmospheric pressure was improved by replacing zirconium with vanadium. (Author)
AD-658 679 HC$3.00 MF$0.65

STRESS-CORROSION CRACKING CHARACTERISTICS OF ALLOYS OF TITANIUM IN SALT WATER.
Interim rept.,
Naval Research Lab Washington D C
R. W. Judy, Jr., and R. J. Goode. 21 Jul 67, 53p Rept no. NRL-6564

Descriptors: (*Titanium alloys, *Stress corrosion), Sea water, Cracks, Fracture (Mechanics), Welds.

The salt water stress-corrosion cracking (SCC) characteristics have been determined for a large number of titanium alloys representatives of commercial production. These data were compiled as part of an NRL program directed to determining the underlying principles of SCC in metals and to establishing procedures for improving the SCC resistance of these metals as well as learning to tolerate the problem where it exists. The SCC resistance was determined using a precracked cantilever bend specimen with analysis by fracture mechanics techniques. The test results for the spectrum of alloys and weldments studied indicate that no correlation with mechanical properties exists, which makes precise prediction of SCC properties of particular alloys difficult, if not impossible. The data obtained provide guideline information for programs similar in nature to the NRL program as well as for alloy development, design and materials selection, and specifications and quality control. (Author)
AD-658 721 HC$3.00 MF$0.65

X-RAY DIFFRACTION STUDY OF ORDERING IN TWO SIGMA PHASES,
Illinois Univ Urbana
R. W. Spor, H. Claus, and Paul A. Beck. 1967, 10p
AROD-5103:8
Grant DA-ARO (D)-31-124-G842
Availability: Published in Advances in X-Ray Analysis v10 p213-20 1967.

Descriptors: (*Rhenium alloys, Atomic structure), X-ray diffraction analysis, Phase studies, Chromium alloys, Iron alloys, Transition elements.

X-ray powder pattern line intensities were measured for the (Cr, Re) sigma and (Re, Fe) sigma phases by a step-scanning diffractometer, using CrK alpha radiation, scintillation counter, and a pulse height analyzer. The measured intensity ratios for all available pairs of adjacent lines were compared by means of a computer with the corresponding calculated intensity ratios based on approximately 1800 different ordering schemes for each alloy. The results showed ordering in both alloys, and indicated that the ordering was based on atomic size. These results are different from those obtained previously by Kasper and Waterstrat (no ordering), and by Ageyev et al. (In (Cr, Re) sigma the Cr atoms are preferentially in large coordination number positions.) (Author)
AD-658 794 Not available from CFSTI.

THE EFFECT OF INTERMEDIATE CONDITIONING IN THE PROCESS OF STEEL FATIGUE ON STEEL DURABILITY,
Foreign Technology Div Wright-Patterson AFB Ohio
L. A. Glikman, and V. P. Tekht. 28 Feb 67, 12p Rept no. FTD-HT-67-138
TT-67-62948
Vliyanie Promekhutochnoi Trenirovki v Protsesse Ustalosti Stali na ee Dolgovechnosti, unedited rough draft trans. of Fizika Metallov i Metallovedenie (USSR), v22 n1 p78-81 1966.

Descriptors: (*Carbon alloys, *Fatigue (Mechanics)), (*Stainless steel, Fatigue (Mechanics)), Stresses, Annealing, Cracks, Argon, Hardening, USSR.

Specimens of carbon steel 40 (0.37-0.45% carbon) and chromium stainless steel 2Kh13 (0.16-0.23% carbon, 12-14% chromium) were subjected to cyclic stresses 10-15% higher than their fatigue strength (29.5-30.6 and 33.7 kg/mm2, respectively) for a number of cycles equal to 75 to 95% of the number of cycles at failure. After that, the stress was lowered to 75-90% of the fatigue strength for 5,000,000 cycles (training period) and then returned to the initial magnitude, which was maintained up to failure. The training significantly improved the fatigue 'life' of both steels. For instance, while untrained specimens of steel 40 under stresses 10 or 15% higher than fatigue strength failed after 192,650-353,500 or 230,650-239,950 cycles, respectively, the trained specimens failed after 254,200-750,600 or 259,400-352,200 cycles; 2Kh13 steel exhibited similar behavior. Post-training annealing of 2Kh13 steel at 650C for 2 hr in argon produced no additional beneficial effect. (Author)
AD-658 879 HC$3.00 MF$0.65

CERTAIN GENERAL PATTERNS IN THE OCCURRENCE OF HYDROGEN BRITTLENESS IN THE ALLOYS VT3-1 AND VT15,
Joint Airworthiness Committee (Great Britain)
B. A. Kolachev, V. A. Livanov, N. Ya. Guselnikov, and A. A. Bukhanova. Jul 67, 20p
RSIC-613, TT-67-62971

Trans. of mono. Novye Issledovaniya Titanovykh Splavov, n.p., 1965 p212-20.

Descriptors: (*Hydrogen embrittlement, *Titanium alloys), Deformation, Fractography, Hydrides, Annealing, Temperature, Plasticity, Mechanical properties, USSR.

Discussed is the development of hydrogen brittleness in an (alpha + beta)-titanium alloy VT3-1 and a beta-titanium alloy VT15. It is shown that hydrogen brittleness develops most intensely in VT3-1 at temperatures less than room temperature and at low strain rates. It is discovered that beta-titanium alloys at temperatures below room temperature are also prone to hydrogen brittleness, the temperature at which this occurs decreasing with a decrease in the hydrogen content. Hydrogen brittleness in the alloy VT15 is found to occur only at low strain rates in a narrow temperature range, approximately from -30C to +10C. Hydrogen brittleness of (alpha + beta)-titanium alloys is believed to be caused by processes developing in the beta-phase during plastic deformation. Since the composition of the beta-phase of VT3-1 after isothermal annealing is close to the composition of the beta-phase of VT15, it is concluded that hydrogen brittleness develops in approximately the same manner in both of them, provided the conditions for mechanical testing are the same for both. (Author)
AD-658 989 HC$3.00 MF$0.65

INFLUENCE OF TEMPERING, PRESTRAINING, AND RETEMPERING ON THE STRENGTH AND TOUGHNESS OF HIGH-STRENGTH 4340 STEEL.
Technical rept.,
Army Materials and Mechanics Research Center Watertown Mass
Eugene Dicesare. Aug 67, 29p Rept no. AMMRC-TR-67-02

Descriptors: (*Steel, *Tempering), Mechanical properties, Cold working, Martensite, Bainite, Toughness, Heat treatment, Tensile properties, Mechanical properties.
Identifiers: Steel 4340.

The influence of tempering, prestraining, and retempering on the strength and toughness of martensitic and bainitic 4340 steel rods was investigated. The initial heat treatment consisted of a quench and temper to obtain martensite in one group and formation of bainite at 575 F followed by tempering in the second group. Reductions of area of 4 to 5 percent were effected by cold drawing through a die with and without backpull, followed by a retempering treatment. Ultimate tensile strengths approaching 385,000 psi for the martensitic structure and 283,000 psi for the bainitic structure resulted with yield-tensile strength ratios approaching unity. Notch tensile strength of the bainite was superior to that of martensite at comparable strength levels. The prestraining also caused a yield point drop and/or serrations in the flow curves. This was influenced by specimen test temperature and strain rate, tempering temperature, and retempering temperature. (Author)
AD-659 003 HC$3.00 MF$0.65

RESEARCH ON MECHANISMS OF ALLOY STRENGTHENING SEMIANNUAL REPORT.
Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy.
N. J. Grant. Jun 67, 19p NASA-CR-87992
Grant NSG 117-61

Descriptors: *Dispersion hardening, *High strength alloy, *Mechanical property, *Metal oxide, *Quenching, Aluminum, Beryllium, Chromium, Copper, Corrosion, Deformation, Fracture, Iron, Nickel, Palladium, Powder, Production, Structure.

For abstract, see STAR 05 21.
N67-35349 HC$3.00 MF$0.65

FATIGUE LIFE UNDER RANDOM LOADING FOR SEVERAL POWER SPECTRAL SHAPES.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
S. A. Clevenson, and R. Steiner. Sep 67, 26p NASA-TR-R-266
Contract 124-08-05-02-23

Descriptors: *Aluminum alloy, *Fatigue life, *Random load, *Structural failure, Alloy, Aluminum, Characteristics, Failure, Fatigue, Frequency, Level, Life, Load, Metallurgy, Mode, Peak, Power, Random, Rupture, Shape, Specimen, Spectrum, Stress, Structural.

For abstract, see STAR 05 21.
N67-35726 HC$3.00 MF$0.65

DEVELOPMENT OF COATINGS FOR TANTALUM ALLOY NOZZLE VANES FINAL REPORT, 1 MAY 1965 - 31 JAN. 1967.
Solar, San Diego, Calif.
A. R. Stetson, and R. T. Wimber. Jul 67, 142p NASA-CR-54529, RDR-1396-3
Contract NAS3-7276

Descriptors: *Nozzle wall, *Protective coating, *Tantalum alloy, *Test method, *Thermal property, Air, Alloy, Argon, Coating, Cycling, Method, Molybdenum, Nozzle, Oxidation, Property, Protection, Silicide, Sintering, Slurry, Tantalum, Test, Thermal, Tungsten, Vanadium, Vane, Wall.

For abstract, see STAR 05 21.
N67-36159 HC$3.00 MF$0.65

BASIC TYPES OF DEFORMATION MICRO-CONTOURS APPEARING ON THE SURFACE OF COMMERCIAL IRON TEST-PIECES DURING FATIGUE TESTING UNDER HEATING IN VACUO.
United Kingdom Atomic Energy Authority, Harwell (England). Information Branch.
M. G. Lozinskii, and A. N. Romanov. Jun 67, 15p AERE-TRANS-1070
Transl. Into English From Mashinovedenie (USSR), No. 3, 1965 P 56-65

Descriptors: *Deformation, *Fatigue test, *Heat treatment, *Iron, *Microstructure, Alloy, Bending, Contour, Fatigue, Heat, Kinetics, Loading, Mechanical, Metal, Surface, Test, Thermal, Treatment, Vacuum.

For abstract, see STAR 05 21.
N67-36191 HC$3.00 MF$0.65

EFFECT OF RECRYSTALLIZATION ON FRICTION PROPERTIES OF SOME METALS IN SINGLE-CRYSTAL AND POLYCRYSTALLINE FORM.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
D. H. Buckley. Sep 67, 20p NASA-TN-D-4143
Contract 125-23-02-10-22

Descriptors: *Metal, *Polycrystal, *Recrystallization, *Single crystal, *Sliding friction, Annealing, Body, Center, Crystal, Cubic, Friction, Property, Single, Sliding, Temperature.

For abstract, see STAR 05 21.
N67-36391 HC$3.00 MF$0.65

11G. Miscellaneous Materials

STUDY OF MAGNETORESISTANCE AND MAGNETIC SWITCHING IN FERROMAGNETIC THIN FILMS.
Naval Air Engineering Center Philadelphia Pa Aeronautical Materials Lab
For primary bibliographic entry see Field 20C.
AD-658 497 HC$3.00 MF$0.65

MAGNETODIELECTRICS,
Foreign Technology Div Wright-Patterson AFB Ohio
L. I. Rabkin. 11 Oct 60, 15p Rept no. MCL-178 TT-61-19357
Magnitodielektriki, unedited rough draft trans. of Elektrichestvo (USSR) n2 p78-84 1959. Figs. omitted.

Descriptors: (*Magnetic materials, Dielectrics), Dielectric properties, Plastics, Magnetic properties, Ferrites, Mechanical properties, Inductance, Rubber, USSR.

The various types of modern magnetodielectrics can be divided into the following four groups: (1) ferroplastics - solid magnetodielectrics with small coercive force; (2) ferroelastics - elastic low coercive magnetodielectrics; (3) magnetoplastics - solid magnetic-inflexible magnetodielectrics; (4) magnetoelastics - elastic magnetic - inflexible magnetodielectrics. The report discusses each group in detail.
AD-658 511 HC$3.00 MF$0.65

ANALYSIS OF MECHANICAL TESTING PROCEDURE FOR BRITTLE MATERIALS.
IIT Research Inst Chicago Ill
For primary bibliographic entry see Field 20K.
AD-658 695 HC$3.00 MF$0.65

HYSTERESIS EVALUATION OF MICROWAVE FERRITES AT AUDIO FREQUENCY WITH LARGE DYNAMIC RANGE.
Meeting speech.
Massachusetts Inst of Tech Lexington Lincoln Lab
Jerald A. Weiss, and Foster Betts. 1967, 4p Rept no. MS-1766
ESD-TR-67-272
Contract AF 19 (628)-5167, ARPA Order-498
Prepared in cooperation with Worcester Polytechnic Inst., Mass.
Availability: Published in Journal of Applied Physics v38 n3 p1397-9 Mar 1 1967.

Descriptors: (*Ferrites, Microwave equipment), Ferromagnetic materials, Hysteresis, Garnet, Audiofrequency, Performance (Engineering), Magnetic properties.

The evaluation of ferrites and ferrimagnetic garnets for use in microwave switches and digital phasers requires, in addition to microwave examination, determination of saturation and remanent magnetization, coercive field, and a measure of squareness, including the dependence of these properties on amplitude of actuating fields, temperature, and internal and externally applied stresses. We have developed a novel method which combines the required accuracy and convenience, and by which we are able to examine, on a single specimen, both the low-field details of hysteresis and the approach to saturation at high fields. The field is produced by a nickel-ferrite electromagnet excited at 60 or 400 Hz, generating a field at amplitudes up to 1000 Oe. The specimen may be a rod, toroid, or other shape. Flux sensing is conventional; sensing of internal field is done by a magnetic potentiometer of special design. Integration is performed by a system incorporating amplifiers which were selected for gain, bandwidth, noise, and drift characteristic adequate to yield substantially distortion-free hysteresis loops under the stringent requirements of high-field excitation. (Author)
AD-658 899 Not available from CFSTI.

METHODS FOR OBTAINING SURFACE TEMPERATURES OF MATERIALS IN THE PRESENCE OF EXTRANEOUS RADIATION.

National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 21.
N67-35727 HC$3.00 MF$0.65

A STUDY OF THE EFFECT OF DEVIATIONS IN ASPHALT CONTENT AND GRADATION FROM JOB-MIX VALUES IN HOT-MIXTURES. PHASE II,
Wisconsin State Highway Commission.
Karl H. Dunn. May 67, 20p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Asphalt, Bituminous coatings), Absorption, Sandstone, Gravel, Mixtures, Specifications, Cements, Tests.
Identifiers: Aggregates (Materials).

A laboratory study was performed on hot bituminous mixtures to determine if asphalt is absorbed into the aggregates of these mixtures that is not recoverable by the reflux extraction procedure. Aggregates from two geological sources, an igneous-sandstone gravel and a crushed dolomite, were used. Specific amounts of aggregate and asphalt cement were mixed, cured for four days, and then extracted. Differences in the apparent asphalt content of mixtures based on extraction tests and the known content based on weights of the mixed materials provided a measure of the amount of asphalt not recoverable by means of extraction. Although the data of this study are quite limited, it can be concluded that some aggregate types may absorb asphalt in hot-bituminous mixtures which is not recovered in an extraction test, and can result in indicated asphalt content of the mixture in excess of tolerance limits now imposed by specifications for control of asphalt content at the mixing plant. (Author)
PB-175 958 HC$3.00 MF$0.65

11H. Oils, Lubricants, and Hydraulic Fluids

PRELIMINARY DETERMINATIONS OF TEMPERATURE LIMITATIONS OF ESTER, ETHER, AND HYDROCARBON BASE LUBRICANTS IN 25-MM BORE BALL BEARINGS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
W. J. Anderson, and E. V. Zaretsky. Sep 67, 23p NASA-TN-D-4146
Contract 720-03-01-01-22

Descriptors: *Ball bearing, *Ester, *High temperature lubricant, *Hydrocarbon, *Polyphenyl ether, Ball, Bearing, Ether, Failure, Fatigue, High temperature, Life, Lubricant, Mode, Polyphenyl, Spalling, Test, Wear.

For abstract, see STAR 05 21.
N67-35751 HC$3.00 MF$0.65

11I. Plastics

IDENTIFICATION OF PLASTICS USED IN NAVAL ORDNANCE,
Naval Torpedo Station Keyport Wash Quality Evaluation Lab
S. B. Knapp, and J. A. Arne. Aug 67, 44p Rept no. QE/K-67-83

Descriptors: (*Plastics, Identification), Visual inspection, Combustion, Chemical analysis, Infrared spectroscopy, Elastomers, Fibers (Synthetic).

Tests are described for identifying plastics found in Naval ordnance weapons. The tests require relatively simple procedures and equipment. Identification tests described are sensory, burning, chemical, and infrared spectroscopic tests. Typical spectrograms are included. (Author)
AD-658 536 HC$3.00 MF$0.65

THE ACTION OF A VIBRATION LOAD ON POLYMER MATERIALS,
Foreign Technology Div Wright-Patterson AFB Ohio
L. A. Galin. 28 Feb 67, 16p Rept no. FTD-HT-67-197
TT-67-62702
O Deistvii Vibratsionnoi Nagruzki na Polimernye Materialy, unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika, n6 p53-8 1965.

Descriptors: (*Plastics, Vibration), Polymers, Loading (Mechanics), Stresses, Deformation, Nonlinear differential equations, Thermal stresses, Stability, Heat transfer, USSR.

The article investigates the vibration load on a strip of polymer material under plane stress conditions. The applied load varies according to harmonic law, whereby its amplitude is constant. The strip is strained in such a way that its sections remain plane. The article investigates the steady-state regime, where the problem amounts to a certain ordinary nonlinear differential equation that is quadratically integrable. Certain cases of non-steady-state regimes are also examined, where the strips, which are initially at rest, begin to be subjected to the action of a vibration load.
AD-658 603 HC$3.00 MF$0.65

POLE-FIGURE INVERSION FOR THE TRICLINIC CRYSTAL CLASS. POLYETHYLENE TEREPHTHALATE,
Duke Univ Durham N C Dept of Chemistry
For primary bibliographic entry see Field 20B.
AD-658 802 Not available from CFSTI.

PREPARATION AND CHARACTERIZATION OF SOME CELLULOSE GRAFT COPOLYMERS. PART IV. SOME PROPERTIES OF ISOLATED CELLULOSE ACETATE-STYRENE GRAFT COPOLYMERS,
Research Triangle Inst Durham N C
J. D. Wellons, and J. L. Williams. 3 Oct 66, 21p AROD-3630:9
Grant DA-ARO (D)-31-124-G283
See also AD-614 731.
Availability: Published in Journal of Polymer Science v5 PtA-1 p1341-57 1967.

Descriptors: (*Cellulose acetates, *Copolymerization), (*Styrene plastics, Copolymerization), Synthesis (Chemistry), Solubility, Films, Compatibility, Permeability, Diffusion, Sorption, Radiation chemistry.
Identifiers: Graft polymers.

A series of purified graft copolymers of cellulose acetate and polystyrene were used for some initial property studies. Grafts with high molecular weight backbones and low molecular weight side chains and vice versa, and with both side chains and backbones of high and low molecular weights, were prepared. The graft polymers were found to be insoluble in most solvents but soluble in dimethylformamide and pyridine and in mixtures of solvents for each component. Films cast from mixtures of the grafts and homopolymers showed that the grafts were compatible with the homopolymer of the component with a higher molecular weight. A graft copolymer with high molecular weight backbone and side chains was found to be compatible with both homopolymers separately and with a mixture of both across a wide range of compositions. A blend of the high and low molecular weight grafts was also found to be highly compatible with both homopolymers. The permeability, diffusion, and sorption of gases and water vapor in the grafts and in the corresponding homopolymers was also studied. In the case of water vapor, the sorption in cellulose acetate was much higher than in polystyrene whereas the diffusion was much lower. It was found that the graft polymers showed both diffusion and solution behavior closer to that of cellulose acetate, whereas the permeability constants were more intermediate between those of the two homopolymers. The gas permeability and diffusion constants were found to be intermediate between the values obtained with the two homopolymers. (Author)
AD-658 933 Not available from CFSTI.

THE PREPARATION AND PROPERTIES OF WELL-DEFINED GRAFT COPOLYMERS.
Final rept. 1 Apr 64-31 Mar 67,
Research Triangle Inst Durham N C Camille Dreyfus Lab
V. T. Stannett, J. A. Gervasi, A. B. Gosnell, and D. K. Woods. 15 Sep 67, 74p
AROD-4714:2-C
Contract DA-31-124-ARO (D)-198
Availability: Published in Various Journals.

Descriptors: (*Styrene plastics, *Copolymerization), (*Vinyl plastics, Copolymerization), Pyridines, Polymers, Synthesis (Chemistry), Isoprene, Solvents, Sulfoxides, Nitriles, Molecular weight, Sorption, Diffusion, Membranes, Films, Rheology.
Identifiers: Graft polymers, Poly (vinyl pyridines).

Contents: The preparation of graft copolymers of polystyrene with poly (2-vinylpyridine) (submitted to J. Polymer Science Part C); Anionic grafting of polystyrene and polyisoprene to living poly (2-vinylpyridine) (submitted to J. Polymer Science Part C); Some anion reactions in dimethyl sulfoxide medium (submitted to Die Makromolekulare Chemie); Reactions of living polystyrene with difunctional nitriles to produce specifically placed grafting sites (submitted to J. Polymer Science Part A); Membranes with anisotropic flow properties (submitted to Polymer).
AD-658 994 Not available from CFSTI.

DIELECTRIC STRENGTH OF RIGID URETHANE FOAM.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
I. N. Einhorn, J. Farrar, and J. Moacanin. 1 Sep 67, 19p NASA-CR-87986, JPL-TR-32-1155
Contract NAS7-100

Descriptors: *Dielectric material, *Dielectrics, *Electronic packaging, *Polyurethane foam, Application, Density, Dielectric, Electronic, Environment, Flexible, Fluorocarbon, Foam, Material, Packaging, Polyurethane, Rigid, Space, Strength, Structure, Voltage.

For abstract, see STAR 05 21.
N67-35367 HC$3.00 MF$0.65

DEVELOPMENT OF TECHNIQUES TO IMPROVE BLADDER MATERIALS AND TEST METHODS INTERIM REPORT, 18 MAY 1966 - 17 MAY 1967.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Stanford Research Inst., Menlo Park, Calif.
R. F. Muraca. 17 Jun 67, 77p NASA-CR-88126, IR-1
Contracts NAS7-100, JPL-951484
Prepared for Jpl

Descriptors: *Differential thermal analysis (dta), *Mechanical property, *Physical property, *Spectrophotometry, *X-ray diffraction, Analysis, Differential, Diffraction, Dispersion, Film, Infrared, Mechanical, Physical, Property, Teflon, Thermal, X-ray.

For abstract, see STAR 05 21.
N67-36115 HC$3.00 MF$0.65

FATIGUE TESTS ON PRESSURISED MEMBRANES OF POLYETHYLENE TEREPHTHALATE.

National Inst. for Research in Nuclear Science, Harwell (England). Rutherford High Energy Lab.
A. J. Middleton. Feb 67, 14p RHEL/R-140

Descriptors: *Fatigue test, *Polyethylene terephthalate, *Thin film, Apparatus, Failure, Fatigue, Film, Flexible, High energy, Load, Membrane, Physics, Polyethylene, Pressurization, Terephthalate, Test, Thin, Window.

For abstract, see STAR 05 21.
N67-36488 HC$3.00 MF$0.65

THE MARKET FOR PLASTICS PRODUCTION EQUIPMENT, RAW MATERIALS AND SEMI-FINISHED PRODUCTS IN ITALY.
Oliver-Beckman Italiana S.r.l., Rome (Italy).
Apr 67, 83p
Prepared in cooperation with Department of Commerce, Washington, D. C. Business and Defense Services Administration.

Descriptors: (*Plastics industry, Italy), (*Commerce, *Plastics), (*Machines, Automation), Industrial equipment, Industrial production, Costs, Economics, Money, Thermoplastics, Thermosetting plastics, Chemical industry, Employment, Labor, Consumption, Condensation, Polymerization.

Italy has attained a remarkable importance in the field of plastics production and has become one of the leading world producers. Today, Italian plastic materials are considered among the best in quality as a result of notable research activity and advanced technology. In one short decade, Italian production of plastic materials rose from 116,000 metric tons to over one million tons, covering almost the full range of condensation and polymerization products, both thermoplastic and thermosetting. In addition to the resins manufactured on an industrial scale, many others are being tested in laboratories or produced in pilot plants. Despite their already satisfactory technological position, Italian manufacturers are actively seeking new materials, improved transformation techniques, and the use of advanced equipment to increase productivity and cut down production costs. A continuing high demand for both resins and semi-finished products kept the over 2,000 firms processing plastic goods very active, while total employment showed significant increases in recent years reaching the peak level of more than 100,000 workers in 1966.
PB-176 095 HC$3.00 MF$0.65

11J. Rubbers

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 9B.
AD-658 439 HC$3.00 MF$0.65

TENSILE STRENGTH OF RUBBERS.
Technical rept.,
Princeton Univ N J Frick Chemical Lab
A. V. Tobolsky, and P. F. Lyons. Sep 67, 13p
ONR-RLT-TR-99
Contract Nonr-1858 (07)

Descriptors: (*Rubber, Tensile properties), (*Elastomers, Tensile properties), Crosslinking (Chemistry), Elongation, Stresses, Thermal stability, Polyethylene plastics, Vulcanizates, Chemical bonds.

A current theory of the tensile strength of rubbers invokes large scale crosslink interchange at room temperature to explain the high tensile strengths of networks crosslinked with weak linkages. This mechanical lability of certain crosslinks has been assumed from their known thermal lability at higher temperatures. Relaxation of stress experiments at various elongations were performed at room temperature on networks crosslinked with both weak and strong linkages. The purpose was to detect mechanically-induced crosslink slippage. No evidence was found of any mechanical lability of weak crosslinks at room temperature. A hypothesis is presented which explains the high tensile strengths of rubbers crosslinked with weak linkages as resulting from an internally relaxed network formed by the thermal lability of the crosslinks at the vulcanization temperature. This theory is shown to be consistent with some previously unexplained experimental results. (Author)
AD-659 065 HC$3.00 MF$0.65

11K. Solvents, Cleaners, and Abrasives

SURFACE CHEMICAL DISPLACEMENT OF WATER AND/OR OIL FROM WEAPONS SUBSTRATES.
Technical rept.,
Army Weapons Command Rock Island Ill Research and Engineering Div
Charles J. Quilty. Aug 67, 27p
RIA-67-2054

Descriptors: (*Weapons, Cleaning), (*Cleaning compounds, Acceptability), (*Surface-active substances, Acceptability), Oils, Water, Removal, Effectiveness, Surface tension, Ketones, Corrosion inhibition, Antioxidants, Organic solvents.
Identifiers: Dimethyl heptanones, Surface chemistry.

In order to develop new and improved materials for weapons cleaning, several amphipathic polar organic liquids were evaluated for their ability to displace water and oil from chromium plated and zinc phosphate coated steel. Several polar-type rust inhibitors were also tested since weapons applications often require temporary protection from corrosion. Effective displacement of water or oil was found to be closely related to Marangani effects at the organic liquid/water-oil interface. Liquids studied were characterized by low surface tensions and high equilibrium spreading pressures. A formulation for water and oil displacement was proposed on the basis of the results obtained in this investigation. The formulation consisted of 2,6-dimethyl-4-heptanone diluted with a small amount of a more-volatile non-polar liquid and small percentages of a rust inhibitor and an antioxidant. (Author)
AD-658 985 HC$3.00 MF$0.65

11L. Wood and Paper Products

AIR-DRYING BEHAVIOUR OF POLES AND POSTS OF EUCALYPTUS VIMINALIS,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Forest Products.
J. E. Barnacle, F. J. Christensen, and L. E. Cuevas. 1967, 28p Technical paper-48

Descriptors: (*Wood, *Protective treatments), Drying, Sodium chloride, Air, Shrinkage, Moisture, Chemicals, Forestry, Australia.

A continuing demand in south-east Australia for preservative-treated poles of certain eucalypt species of low natural durability has led to a shortage of readily accessible supplies of this material in the larger, power distribution sizes. Poles of Eucalyptus viminalis Labill., although in good supply and of suitable form, have a reputation for developing excessive drying degrade and are rarely used. The main purpose of this study was to investigate the air-drying behaviour of E. viminalis poles and whether changes in dried quality were produced by the use of special seasoning methods. These included sap-ringing before felling, drying at stump in the forest, and, for material taken to a pole-drying yard, stack covering, end coating, end restraint, and soaking in a concentrated sodium chloride solution before drying. (Author)
PB-176 061 HC$3.00 MF$0.65

AN ASSESSMENT OF THE PULPING POTENTIAL OF VARIOUS WESTERN AUSTRALIAN WOOD SPECIES,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Forest Products.
F. H. Phillips, R. B. Bain, and A. J. Watson. 1967, 30p Technical paper-49

Descriptors: (*Wood pulp, Australia), Sampling, Trees, Sulfates, Chemicals, Mechanical properties, Tables, Analysis, Tests.

Pulping studies have been carried out on various wood samples collected from the south-western area of Western Australia. Sulphate and neutral sulphite semichemical pulps have been prepared from all eucalypt samples. Although mature wood of E. calophylla gave a sulphate pulp with higher tearing resistance than that produced from thinnings, all other properties were inferior, and more chemicals were required to pulp this wood sample. Eucalyptus diversicolor and E. marginata pulps prepared from sawmill waste by sulphate and NSSC processes were inferior to pulps from thinnings of the same species. However, selection of the waste material so that wood from near the centre of the trees was excluded gave sulphate pulps with improved papermaking properties. Thinnings of P. pinaster gave satisfactory sulphate, NSSC, and refiner groundwood pulps. The addition of beaten P. pinaster sulphate pulp to E. diversicolor sulphate pulp increased the tearing resistance and folding endurance of handsheets made from the latter pulp but did not improve bursting strength. (Author)
PB-176 062 HC$3.00 MF$0.65

12. MATHEMATICAL SCIENCES

12A. Mathematics and Statistics

THE 'VALUE OF THE GAME' AS A TOOL IN THEORETICAL ECONOMICS,
Rand Corp Santa Monica Calif
L. S. Shapley. Aug 67, 17p Rept no. P-3658
Prepared for presentation at the Inst. of Management Sciences International Meetings (14th), Mexico City (Mexico), 22-26 Aug 67.

Descriptors: (*Game theory, *Economics), (*Probability, *Measure theory), Money, Labor, Wages, Random variables, Inequalities, Approximation (Mathematics), Difference equations, Management engineering.

The 'value' is a solution concept for cooperative n-person games that gives for each player, an unbiased measure of his expected marginal worth to a coalition formed at random. In this paper, several games based on very simple economic models dealing with ownership, production, and exchange will be formulated and solved for their values. These examples have been selected (more for their methodology than their economics) from a dozen or so comparable economic games treated in recent papers.
AD-658 427 HC$3.00 MF$0.65

ON THE SUMS OF INDEPENDENTLY DISTRIBUTED PARETO VARIATES,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 17I.
AD-658 430 HC$3.00 MF$0.65

STUDIES IN PROBLEM SOLVING: SUBJECT 3 ON THE CRYPT-ARITHMETIC TASK DONALD+GERALD=ROBERT,
Carnegie-Mellon Univ Pittsburgh Pa Dept of Computer Science
For primary bibliographic entry see Field 5J.
AD-658 485 HC$3.00 MF$0.65

EIGHT LECTURES ON STATISTICAL INFERENCE IN STOCHASTIC PROCESSES.
Technical rept.,
Brown Univ Providence R I Div of Applied Mathematics
Ulf Grenander. May 67, 68p Rept no. TR-2
Contract DA-28-043-AMC-00183 (E)
See also AD-652 287.

Descriptors: (*Stochastic processes, Statistical analysis), Pattern recognition, Statistical processes, Mathematical models, Integrals, Sampling, Theorems, Integral equations, Matrix algebra.
Identifiers: Maximum likelihood, Euclidean space.

Contents: Models; Observables; The general problem; Testing hypotheses; The singular case; Linear estimation, Quadratic estimation; Markov processes, Pattern recognition; Research problems: inference in processes.
AD-658 673 HC$3.00 MF$0.65

ON STEPWISE MULTIPLE LINEAR REGRESSION,
Ballistic Research Labs Aberdeen Proving Ground Md
Harold J. Breaux. Aug 67, 53p Rept no. BRL-1369

Descriptors: (*Regression analysis, Numerical methods and procedures), Least squares method, Equations, Computer programs, Algorithms, Optimization, Matrix algebra, Statistical analysis, Theorems.

Stepwise multiple linear regression has proved to be an extremely useful computational technique in data analysis problems. This procedure has been implemented in numerous computer programs and overcomes the acute problem that often exists with the classical computational methods of multiple linear regression. This problem manifests itself through the excessive computation time involved in obtaining solutions to the (2 to the Nth power -1) sets of normal equations that arise when seeking an optimum linear combination of variables from the subsets of the N variables. The procedure takes advantage of recurrence relations existing between covariances of residuals, regression coefficients, and inverse elements of partitions of the covariance matrix. The application of these recurrence formulas is equivalent to the introduction or deletion of a variable into a linear approximating function which is being sought as the solution to a data analysis problem. This report contains derivations of the recurrence formulas, shows how they are implemented in a computer program and includes an improved algorithm which halves the storage requirements of previous algorithms. A computer program for the BRLESC computer which incorporates this procedure is described by the author and others in a previous report, BRL Report No. 1330, July 1966. The present report is an amplification of the statistical theory and computational procedures presented in that report in addition to the exposition of the improved algorithm. (Author)
AD-658 674 HC$3.00 MF$0.65

MATRIX SCALING WITH RESPECT TO THE MAXIMUM-NORM, THE SUM-NORM, AND THE EUCLIDEAN NORM,
Interim technical rept.,
Texas Univ Austin Computation Center
Peter Arthur Businger. Aug 67, 123p Rept no. TR-15
AROD-3772:33-M
Grants DA-ARO (D)-31-124-G721, NSF-GP-5253

Descriptors: (*Matrix algebra, Numerical analysis), (*Equations, Numerical analysis . Theses, Numbers, Vector spaces, Inequalities, Theorems, Optimization.
Identifiers: Eigenvalues.

The condition number of a nonsingular matrix A with respect to the inversion problem and with respect to a vector norm is defined by cond (A) = lub (A)lub (A superscript-1), where lub (.) denotes the matrix bound subordinate to the norm. The spectral condition number can be regarded as a 'measure by which A fails to be a scalar multiple of a unitary matrix.' Other such measures are considered and related to cond (A).
AD-658 675 HC$3.00 MF$0.65

AN EXTENSION OF PONTRYAGIN'S MAXIMUM PRINCIPLE.
Technical rept. 1 Oct 66-30 Sep 67,
Ohio State Univ Research Foundation Columbus
J. T. Tou, and H. H. Yeh. Sep 67, 118p Rept no. TR-3
Contract Nonr-495 (29)

Descriptors: (*Mathematical models, Optimization), (*Control systems, Design), Problem solving, Theorems, Linear systems, Interpolation, Hamiltonian, Algebraic topology, Minimax technique, Costs, Inequalities, Real numbers.

The problem of optimum control of systems whose control signals belong to a prespecified class of functions is studied. The result is formulated in a maximum principle of the Pontryagin type. The extended maximum principle states that a necessary condition for the optimum control is that the first variation of the time integral of the Hamiltonian is zero if the control function can vary in two opposite directions, is non-positive if the control function can vary in only one direction. The conditions imposed on the admissible controls are: (i) The control signals may be restricted to a prespecified class of functions which are piecewise continuous with a finite number of points of discontinuity, and which are continuous on the left at every instant under consideration (has no isolated points on the time curve). (ii) The admissible class of controls admits infinitesimal variation. (iii) The control signals satisfy some boundedness constraints. The extended maximum principle is proved for the three classes of systems: Class (1) The system is linear with respect to the control variables. Class (2) The control function of the system is a scalar or the finite variations of all components of the control vector occur in precisely the same intervals. Class (3) The points of discontinuity of the control function are not subject to variation.
AD-658 709 HC$3.00 MF$0.65

CLASSIFICATION AND DEFORMATION OF RIEMANIAN SPACES,
California Univ Los Angeles
Mitsuru Nakai, and Leo Sario. 25 Jul 66, 19p
AROD-1517:93
Grant DA-ARO (D)-31-124-G742
Prepared in cooperation with Nagoya Univ. (Japan).
Availability: Published in Math Scan v20 p193-208 1967.

Descriptors: (*Algebraic topology, Classification), Invariance, Conformal mapping, Mapping (Transformations), Green's function, Convergence, Vector spaces, Hilbert space, Inequalities, Theorems.
Identifiers: Harmonic functions, Euclidean space.

The classification theory of Riemannian spaces with respect to the existence or nonexistence of harmonic functions with various boundedness properties is discussed. For 2-spaces harmonicity is known to be invariant not only under isometries but also under conformal mappings. In contrast, there is no conformal invariance for higher dimensions. The definitions of the null classes OG, OHD, and OKD are given, and characterized by equivalence relations. The Dirichlet mappings are introduced and it is demonstrated that the null classes are invariant under Dirichlet mappings. In particular, quasi-conformal mappings of Riemannian 2-spaces are shown to be Dirichlet mappings. It is established that the invariance under quasi-conformal mappings is lost for higher dimensions. Proofs are given. The paper closes with the result that quasi-isometries are Dirichlet mappings, hence the quasi-isometric invariance of OG, OHD, and OKD. (Author)
AD-658 760 Not available from CFSTI.

DISTRIBUTION OF THE RESIDUAL SUM OF SQUARES IN FITTING INEQUALITIES.
Revised ed.,
Princeton Univ N J
J. A. Hartigan. Aug 66, 16p
Research supported in part by NSF and Nonr.
Availability: Published in Biometrika v51 n1/2 p69-84 1967.

Descriptors: (*Statistical analysis, Mathematical models), (*Inequalities, Mathematical models), Random variables, Iterative methods, Vector spaces, Hilbert space, Least squares method, Theorems.
Identifiers: Maximum likelihood.

Consider a model for n observations, Y sub i = mu sub i + sigma (xi sub i), i = 1,...,n, where the xi sub i are n independent unit normal variables and the mu sub i are restrained by p linear inequalities. The maximum-likelihood estimate of braces (u sub i) is braces (Y sub oi) minimizing Summation (Y sub i - Y sub oi) quantity squared, subject to the linear inequalities; the computation of braces (Y sub oi) requires quadratic programming. This paper is concerned with the distribution of the residual sum of squares Summation (Y sub i - Y sub oi) quantity squared, which it is natural to use for inference about sigma squared.
AD-658 785 Not available from CFSTI.

CORRELATION OF RANGES OF CORRELATED DEVIATES,
Princeton Univ N J
T. E. Kurtz, R. F. Link, J. W. Tukey, and D. L. Wallace. 1966, 7p
Research supported in part by Nonr, NSF and AROD.
Availability: Published in Biometrika v53 n1/2 p191-7 1966.

Descriptors: (*Sampling, Random variables), (*Analysis of variance, Sampling), Transformations (Mathematics), Approximation (Mathematics), Probability, Statistical analysis, Theorems.

The correlation between ranges of correlated normal deviates is assessed, exactly for ranges of 2 and 3, approximately for ranges of 4 or more, with results modifying those of Hartley (1950). The approximation is asymptotic in the correlation between the deviates. The derivation is based on a lemma that should be useful for other statistics. (Author)
AD-658 787 Not available from CFSTI.

MAP COHOMOLOGY OPERATIONS AND ENUMERATION OF VECTOR BUNDLES,
Northwestern Univ Evanston Ill
Lawrence L. Larmore. 18 Nov 66, 13p
AROD-4489:10
Grant DA-31-124-ARO (D)-144
Availability: Published in Journal of the Mathematics and Mechanics v17 n2 p199-208 1967.

Descriptors: (*Algebraic topology, Classification), Sequences, Groups (Mathematics), Vector spaces.

Mapping (Transformations), Theorems.
Identifiers: Map-cohomology operations.

This paper is a continuation of the work of Dold-Whitney on the classification of vector bundles over a finite dimensional space. A new tool, map-cohomology operations, is described. This concept proves useful in the classification of maps by homotopies. (Author)
AD-658 790 Not available from CFSTI.

DISTAL FUNCTIONS ON GROUPS,
Massachusetts Inst of Tech Cambridge
A. W. Knapp. 29 Mar 66, 42p
AFOSR-67-2177
Grant AF-AFOSR-335-63
Availability: Published in Transactions of the American Mathematical Society v128 n1 p1-40 Jul 1967.

Descriptors: (*Functions, *Groups (Mathematics)), Algebras, Theorems, Approximation (Mathematics), Mapping (Transformations), Inequalities.
Identifiers: Distal functions, Hausdorff space.

The paper gives an analysis and synthesis of distal functions. The key to the results is the notion of relative almost periodicity.
AD-658 795 Not available from CFSTI.

TIME-DOMAIN APPROXIMATION BY ITERATIVE METHODS.
Princeton Univ N J Dept of Electrical Engineering
For primary bibliographic entry see Field 9A.
AD-658 810 Not available from CFSTI.

APPROXIMATIONS OF BEST LINEAR, UNBIASED ORDER-STATISTIC ESTIMATORS.
Technical rept.
Weibull (Waloddi) Lausanne (Switzerland)
Jun 67, 38p
AFML-TR-67-198
Contract AF 61 (052)-943

Descriptors: (*Sampling, Approximation (Mathematics)), (*Statistical analysis, Approximation (Mathematics)), Matrix algebra, Analysis of variance, Least squares method, Random variables, Tables.
Identifiers: Order statistics.

Formulas for two types of approximations of the best linear, unbiased order-statistic estimator, both dispensing with the covariance matrices, have been developed and applied to the y- and z-estimators. Extensive tables for the coefficients of these estimators, their variances and covariances have been accomplished by use of an IBM 7090 computer. The efficiencies of the approximations in relation to the exact solutions have been determined for various sample sizes and shape parameters. A measure of goodness of fit has been proposed, and its mean, percentiles and variance has been determined by use of a Monte-Carlo study, involving ten thousand random samples for each of thirteen sample sizes from N = 3 to 100. (Author)
AD-658 845 HC$3.00 MF$0.65

UTILITY FUNCTIONS FOR PARTIALLY ORDERED TOPOLOGICAL SPACES.
Research memo.,
Hebrew Univ Jerusalem (Israel) Dept of Mathematics
Bezalel Peleg. Aug 67, 11p Rept no. RM-29
Contract F61052-67-C-0094
Rept. on Research Program in Game Theory and Mathematical Economics.

Descriptors: (*Game theory, *Topology), Set theory, Mathematics, Theorems.

Sufficient conditions are given for the existence of continuous numerical representations (utilities) for partially ordered topological spaces. (Author)
AD-658 892 HC$3.00 MF$0.65

LECTURE NOTES PREPARED IN CONNECTION WITH THE SUMMER SEMINAR ON MATHEMATICS OF THE DECISION SCIENCES HELD AT STANFORD UNIVERSITY, STANFORD, CALIFORNIA, JULY 10 - AUGUST 11, 1967.
American Mathematical Society Providence R I
For primary bibliographic entry see Field 12B.
AD-658 894 HC$3.00 MF$0.65

ENTROPY, A COMPLETE METRIC INVARIANT FOR AUTOMORPHISMS OF THE TORUS,
IBM Watson Research Center Yorktown Heights N Y
R. L. Adler, and B. Weiss. 1967, 7p
AFOSR-67-2171
Contract AF 49 (638)-1682
Availability: Published in Proceedings of the National Academy of Sciences v57 n6 p1573-6 Jun 1967.

Descriptors: (*Topology, *Measure theory), Invariance, Theorems.

A continuous automorphism phi of the n-dimensional torus X = R to the 2nd power/Z to the 2nd power is associated with a unimodular matrix phi = (phi sub ij), i.e., phi sub ij are integers, and det phi = plus or minus 1. Such a transformation preserves Haar measure; and it is ergodic if and only if no characteristic value of phi is a root of unity. For such transformations phi and phi' there are three kinds of conjugacy: algebraic theta phi/theta = phi' where theta is unimodular; topological, theta phi/theta = phi', where theta is a homemorphism; and metric, where theta is a measure preserving transformation. It is known that here topological conjugacy is equivalent to algebraic and, hence, implies metric. It is also known that if two measures preserving transformations are metrically conjugate, then they have the same entropy. This work proves a converse statement. Theorem: If two continuous ergodic automorphisms phi and phi' of the two-dimensional torus have the same entropy, then they are metrically conjugate. (Author)
AD-658 957 Not available from CFSTI.

ON THE ANALYTIC PROPERTIES OF SOLUTIONS OF EQUATION DELTA u + xu sub x + yu sub y + c (r)u = O,
Indiana Univ Bloomington Dept of Mathematics
G. S. S. Avila, and R. P. Gilbert. 13 Jul 66, 13p
AFOSR-67-2190
Grant AF-AFOSR-1206-67
Prepared in cooperation with Georgetown Univ., Washington, D. C., Grant NSF-GP-5023.
Availability: Published in Duke Mathematical Journal v34 n2 p353-62 Jun 1967.

Descriptors: (*Partial differential equations, *Operators (Mathematics)), Analytic functions, Complex variables, Integral equations, Series.

In a number of papers published in the past few years R. P. Gilbert and H. C. Howard have investigated the solutions of several partial differential equations by an integral operator method. This method is based on the construction of two integral operators, one of which maps analytic functions of a complex variable into solutions of the differential equation, and the other being an inverse operator. Solutions of the equation U sub xx + U sub yy + u sub x + YU sub y + c (r)u = O where rc (r) is assumed to be an entire function of r = (x to the 2nd power + y to the 2nd power) to the 1/2 power are studied by using methods of Gilbert. (Author)
AD-658 964 Not available from CFSTI.

A COMPUTER PROGRAM FOR FACTOR ANALYSIS OF PHYSICAL PROPERTIES.
Interim technical rept.,
Stevens Inst of Tech Hoboken N J
E. R. Malinowski, and P. H. Weiner. 15 Aug 67, 42p
AROD-3930:12-C
Contract DA-31-124-ARO (D)-90

Descriptors: (*Factor analysis, *Computer programs), (*Molecules, Chemical properties), Matrix algebra, Computer programs, Input-output devices, Experimental data, Mathematical models, Predictions, Molecular properties, Problem solving, Accuracy, Tables.

The mathematical formulation of Factor Analysis is developed for the purpose of analyzing physical properties of molecules. A least-squares method of finding physically significant parameters is discussed. A computer program (FORTRAN II) for Factor Analysis is presented in order to elucidate the various steps involved, and an example problem is solved. (Author)
AD-658 991 HC$3.00 MF$0.65

CONVOLUTION ALGEBRAS ON LOCALLY COMPACT SPACES.
Technical rept.,
Illinois Univ Urbana
William W. Fairchild. Mar 67, 68p
AROD-5254:11-M
Contract DA-31-124-ARO (D)-288
Doctoral thesis.

Descriptors: (*Algebras, Problem solving), (*Measure theory, *Rings (Mathematics)), Operators (Mathematics), Theorems, Topology, Groups (Mathematics), Differential equations, Theses, Mapping (Transformations).

The work continues the investigations which concern themselves with generalizations of the classical notion of convolution on topological groups. That such generalizations are warranted is clear from various examples, for instance those arising from differential equations, central functions, groups and semi-groups of operators, Delsarte translation operators, and hypercomplex systems.
AD-658 992 HC$3.00 MF$0.65

QUALITATIVE THEORY OF DIFFERENTIAL EQUATIONS AND STRUCTURAL STABILITY,
Brown Univ Providence R I Center for Dynamical Systems
M. M. Peixoto. 1967, 14p
AFOSR-67-2203
Grants AF-AFOSR-693-65, NGR-40-002-015
Availability: Published in Differential Equations and Dynamical Systems p469-80 1967.

Descriptors: (*Differential equations, Theory), Stability, Integrals, Topology.

The paper contains a survey of recent work on the qualitative theory of differential equations related to the concept of structural stability. The author announces without proof a few results and conjectures of his own. (Author)
AD-659 006 Not available from CFSTI.

GEOMETRIC THEORY OF FUNCTIONAL-DIFFERENTIAL EQUATIONS,
Brown Univ Providence R I Center for Dynamical Systems
Jack K. Hale. 1967, 22p
AFOSR-67-2219
Grant AF-AFOSR-693-65
Availability: Published in Differential Equations and Dynamical Systems p247-66 1967.

Descriptors: (*Differential equations, *Differential geometry), Equations, Theory.

The report is essentially a summary of recent research on functional differential equations which are geometric in nature. The motivating theme is to emphasize by means of specific results the advantages of discussing functional differential equations in infinite rather than finite dimensional space. These advantages deal both with the questions that are asked about functional differential equations as well as improvements over previous work which did not use infinite dimensional space. (Author)
AD-659 007 Not available from CFSTI.

REFORMULATION OF THE NAGAOKA EQUATIONS,
Maryland Univ College Park Dept of Physics and Astronomy
David S. Falk, and Michael Fowler. 23 Nov 66, 6p
AFOSR-67-2184
Grant AF-AFOSR-735-65
Research supported in part by NRC, Canada. Prepared in cooperation with Toronto Univ., (Ontario).
Availability: Published in The Physical Review Journal v158 n3 p567-70 Jun 15 1967.

Descriptors: (*Green's function, *Mathematical analysis), Electrons, Approximation (Mathematics), Temperature, Magnetic properties, Impurities, Equations of motion.

The Green's-function equations describing an electron gas in the presence of a magnetic impurity have been approximated by Nafaoka by means of a truncation procedure that keeps correlations between the spins of the impurity and a conduction electron, but neglects higher correlations. Nagaoka's approximate equations are examined here and reformulated as a one-dimensional nonlinear equation. This equation is solved for temperatures not too close to TK, a characteristic temperature of the system, and shown to have two solutions: a normal solution which exists at all temperatures and a condensed solution valid only below Tk. Perturbative corrections to the normal solution are presented. (Author)
AD-659 008 Not available from CFSTI.

THE STRUCTURE OF THE LEVEL SURFACES OF A LYAPUNOV FUNCTION,
Michigan Univ Ann Arbor Dept of Mathematics
F. Wesley Wilson, Jr. 24 Feb 66, 9p
AFOSR-67-2174
Contract DA-31-124-ARO (D)-270, Grant AF-AFOSR-693-65
Availability: Published in Journal of Differential Equations v3 n3 p323-9 Jul 1967.

Descriptors: (*Special functions (Mathematical), *Topology), Stability, Surfaces, Set theory, Differential equations.
Identifiers: Lyapunov functions.

Let f be a real-valued Cl function which is defined on Euclidian space R (n). We are interested in characterizing the noncritical level surfaces of f near its isolated relative maxima and minima. The technique which is used for this investigation is to study the relationship between the trajectories of a differential equation and its Lyapunov function. As an application of interest, we obtain characteristics of the level surfaces of a Lyapunov function and of the domain of asymptotic stability of an asymptotically stable critical point. The domain of asymptotic stability is diffeomorphic to R (n), and the level surfaces are manifolds (as smooth as the defining function) which are homotopically equivalent to the (n-l)-sphere S (n-l). It follows from the generalized Poincare conjecture that the level surfaces are spheres if n not equal to 4,5. When n = 5, the problem of whether or not the level surface is homeomorphic to the sphere is equivalent to the Poincare conjecture. The paper concludes with a discussion of similar statements for asymptotically stable sets and nonautonomous systems. (Author)
AD-659 010 Not available from CFSTI.

EXTREME POINTS OF LEONTIEF SUBSTITUTION SYSTEMS.
Technical rept.,
Stanford Univ Calif Dept of Operations Research
Arthur F. Veinott, Jr. 1 Oct 67, 30p Rept no. TR-11
Contract Nonr-225 (77)

Descriptors: (*Matrix algebra, Boundary value problems), Convex sets, Set theory, Mathematical programming, Operations research.

A Leontief matrix is a matrix A having exactly one positive element in each column and for which there is a nonnegative (column) vector x such that Ax is positive. Let X (b) be the set of nonnegative solutions to Ax = b where A is Leontief and b > or = 0. The following results are established. An element of X (b) is an extreme point of X (b) if and only if it is determined by a Leontief basis matrix. If A is integral, the extreme points of X (b) are integral for all nonnegative integral b if and only if the determinant of each Leontief basis matrix equals one. The class of Leontief matrices for which X (b) is bounded for all b > or = 0 is characterized. The infimum of a concave function over X (b) is concave in b on the nonnegative orthant. The above results are shown to extend easily to matrices with at most one positive element in each column. (Author)
AD-659 045 HC$3.00 MF$0.65

EVALUATION OF FACTOR ANALYTIC RESEARCH PROCEDURES BY MEANS OF SIMULATED CORRELATION MATRICES.
Illinois Univ Urbana Dept of Psychology
For primary bibliographic entry see Field 5J.
AD-659 060 HC$3.00 MF$0.65

OPTIMAL DESIGNS ON TCHEBYCHEFF POINTS,
Purdue Univ Lafayette Ind Dept of Statistics
William J. Studden. Sep 67, 29p Rept no. Mimeograph Ser-118
Contracts Nonr-1100 (26), F33615-67-C-1244

Descriptors: (*Optimization, Regression analysis), Design, Combinatorial analysis, Measure theory, Vector analysis, Experimental design, Polynomials, Minimax technique.
Identifiers: Chebychev points.

Kiefer and Wolfowitz (1959) proved that the optimal design for estimating the highest coefficient in polynomial regression is supported by certain Tchebycheff points. Hoel and Levine (1964) showed that the optimal designs for extrapolation in polynomial regression were all supported by the Tchebycheff points. These results were extended by Kiefer and Wolfowitz (1965) to cover nonpolynomial regression problems involving Tchebycheff systems and the large class of designs supported by the Tchebycheff points was characterized. In the present paper it is shown that the optimal design for estimating any specific parameter is supported by one of two sets of Tchebycheff points. Different proofs of the Kiefer-Wolfowitz results are also presented. (Author)
AD-659 064 HC$3.00 MF$0.65

ON THE STRUCTURE OF THE ISOTOPIC TRANSPORT OPERATORS IN THREE INDEPENDENT SPACE VARIABLES,
Argonne National Lab., Ill.
Erwin H. Bareiss, and Ibrahim K. Abu-Shumays. May 67, 68p
Contract W-31-109-eng-38

Descriptors: (*Integration, Functions), (*Matrix algebra, *Operators (Mathematics)), Theorems, Partial differential equations.
For abstract, see NSA 21 19.
ANL-7328 HC$3.00 MF$0.65

ROUNDING ERROR BOUNDS BY PERTURBATION- CONDITION ANALYSIS.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
D. J. Rose. Sep 67, 33p NASA-TN-D-4113
Contract 125-23-03-05

Descriptors: *Eigenvalue, *Error, *Perturbation, Algorithm, Analysis, Bound, Conditioning, Equation, Euclidean space, Matrix, Norm, Numerical, Problem, Reduction, Round.

For abstract, see STAR 05 21.
N67-35614 HC$3.00 MF$0.65

INTEGRATION IN LOCALLY COMPACT SPACES BY MEANS OF UNIFORMLY DISTRIBUTED SEQUENCES.
Technische Hogeschool, Eindhoven (Netherlands).
K. A. Post. 20 Jun 67, 84p

Descriptors: *Distribution function, *Integration, *Set theory, *Theorem proving, Borel, Compactness, Continuous, Distribution, Function, Local, Measurement, Proving, Sequence, Set, Theorem, Theory, Topology, Unbounded, Uniform.

For abstract, see STAR 05 21.
N67-35945 HC$3.00 MF$0.65

LIMIT THEOREMS FOR ADDITIVE-MULTIPLICATIVE RANDOM SEQUENCES,
Oak Ridge Natural Lab., Tenn.
A. S. Paulson, and V. R. R. Uppuluri. Jul 67, 83p
Contract W-7405-eng-26

Descriptors: (*Probability, Convergence), Theorems, Moments, Difference equations, Random variables.

For abstract, see NSA 21 19.
ORNL-4144 HC$3.00 MF$0.65

DEVELOPMENT OF COMPUTER AIDS FOR TAPE-CONTROL OF PHOTOCOMPOSING MACHINES. REPORT NO. 2. EXTENSION OF THE SYSTEM OF PREPARING A COMPUTER-PROCESSED TAPE TO INCLUDE THE SETTING OF MULTIPLE LINE EQUATIONS.
American Mathematical Society, Providence, R. I.
For primary bibliographic entry see Field 14E.
PB-175 939 HC$3.00 MF$0.65

POLYNOMIAL CURVE FIT BY LEAST SQUARES,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
RFP-968 HC$3.00 MF$0.65

12B. Operations Research

ON THE CONSTRUCTION OF ORTHOGONALIZED SQUARES BY FINITE FIELDS.
Professional paper,
System Development Corp Santa Monica Calif
N. E. Willmorth. 26 Jul 67, 18p Rept no. SP-2897

Descriptors: (*Experimental design, Mathematical analysis), (*Algebra, Number theory), Prime numbers, Polynomials, Mathematical analysis.
Identifiers: Latin square, Graeco-Latin square.

Comment concerning a recent paper (1) on the confounded factorial approach to the construction

of incomplete block designs indicates the desirability of considering other, less complex, construction methods. This paper is limited to the finite field approach to the generation of orthogonalized squares. Three general cases are discussed: (a) where the number of elements, m, in a row or column of a square is a prime; (b) where m is the power of a prime; and (c) where m is a product of several primes or powers of primes. These three cases, of course, cover all positive integers. The construction methods are limited, however in that while the minimum number of orthogonalized squares is determined by the least prime power law (i.e., s = min (p superscript i - 1), where s is the number of squares and p superscript i is the smallest number in the product m = (p superscript i) (p superscript j) (p superscript k), the maximum number of squares is not directly determinable. For instance, in cases where the least prime power is equal to 2 (i.e., p superscript i = 2, and, in general, numbers of the form 4k + 2), it was long thought that not even orthogonal pairs of squares existed. However, although at least pairs of squares have been found for such cases using other methods, these methods are not covered here. (Author)
AD-658 468 HC$3.00 MF$0.65

SENSITIVITY ANALYSIS IN MULTITERMINAL FLOW NETWORKS,
California Univ Berkeley Operations Research Center
Francisco K. Rado. Jun 67, 50p Rept no. ORC-67-22
Contract DA-31-124-ARO (D)-331, Grant NSF-GK-1684

Descriptors: (*Networks, Mathematical analysis), Algorithms, Iterative methods, Operations research, Optimization, Subroutines, Theorems.
Identifiers: Sensitivity analysis.

Algorithms are given for determining the influence of varying the capacity of an arc or of several arcs with linearly related capacities, on the maximal flows between every pair of nodes in an undirected network. This work builds upon the fundamental work of Gomory and Hu, and is closely related to the approach of Elmaghraby, who also gives algorithms for solving these problems. (Author)
AD-658 510 HC$3.00 MF$0.65

DUALITY IN DISCRETE PROGRAMMING.
Technical rept.,
Stanford Univ Calif Operations Research House
Egon Balas. Aug 67, 36p Rept no. TR-67-5
Contracts N00014-67-A-0112-0011, DAHC04-67-C-0028
Revision of manuscript submitted Jul 67.

Descriptors: (*Linear programming, Problem solving), Optimization, Theorems, Saddle point method, Real numbers, Minimax technique, Decision making, Economics, Mathematical programming, Operations research.

A duality theory is proposed for discrete programming. The mixed-integer programming problem is shown to be a special case of a minimax problem with a Lagrangian-type objective function, linear constraints, and some variables constrained to belong to an arbitrary set of real numbers. The dual of this problem is formulated as a problem of the same type, and such that the dual of the dual is the primal. It is shown that the primal has an optimal solution if and only if the dual has one, and in this case the values of their respective objective functions are equal. An optimal solution to the primal and the dual is shown to have the saddle-point property of optimal solutions to a pair of dual linear (and certain nonlinear) programs. A certain type of complementary slackness is shown to hold. Conditions for the uniqueness of a solution are examined. Finlly, an economic interpretation is outlined in terms of a generalized shadow-prince system for mixed-integer programs.
AD-658 740 HC$3.00 MF$0.65

A GRAPH DECOMPOSITION TECHNIQUE FOR STRUCTURING DATA.
Final rept.,
Computer Command and Control Co Washington D C
Paul A. Jensen. 1 Sep 67, 78p Rept no. 106-3
Contract Nonr-4815 (00)

Descriptors: (*Data storage systems, *Operations research), Graphics, Theory, Algorithms, Minimax technique, Optimization, Dynamic programming, Computer logic, Programming (computers).

For a number of advanced computer applications it will be necessary to store large quantities of data concerning relationships between a procedure for structuring transitive noncommutative relational data in a series of acyclical graphs which permit rapid access to the information. It is primarily concerned with providing algorithms which determine data structures which minimize the expected search time to discover the truth of the relation between an arbitrary pair of items. To provide computationally feasible techniques, it is necessary to temper the goal of optimality somewhat, using heuristic justification to greatly reduce the set of feasible structures. The resultant techniques utilize a max-flow min-cut algorithm and dynamic programming. (Author)
AD-658 756 HC$3.00 MF$0.65

IMPLICIT ENUMERATION USING AN IMBEDDED LINEAR PROGRAM,
Rand Corp Santa Monica Calif
A. M. Geoffrion. Sep 67, 20p Rept no. RM-5406-PR
Contract F44620-67-C-0045

Descriptors: (*Linear programming, *Optimization), Numerical methods and procedures, Algorithms, Mathematical programming, Scheduling, Approximation (Mathematics), Iterative methods, Air Force.

The report discusses a zero-one integer linear programming code for solving a general class of discrete optimization problems. The code is designed for problems of up to 90 binary variables and 50 constraints. Two main approaches are used to reduce computing time: (1) periodic application of linear programming to continuous approximations to subproblems generated by partial solutions; (2) periodic introduction of composite redundant constraints. By introducing a measure of 'strength,' strong composite constraints can be computed by linear programming.
AD-658 814 HC$3.00 MF$0.65

ANOTHER OPTIMAL STOPPING PROBLEM,
Rand Corp Santa Monica Calif
Thomas A. Brown. Sep 67, 11p Rept no. P-3635

Descriptors: (*Decision theory, Optimization), Probability density functions, Operations research, Scientific research, Sequences, Management planning.

Randolph has discussed the following problem: suppose an experimenter takes observations X1, X2, ... sequentially from a given population. Each observation costs a fixed amount c. After each observation the experimenter can either stop and take as his reward the maximum of the Xi so far observed, or he can take another observation. The problem is to discover what policy will maximize net return (the difference between reward and costs). The purpose of this note is to discuss a problem that leads to an optimal stopping rule which terminates the experiment whether the largest observed X is small or large.
AD-658 820 HC$3.00 MF$0.65

SOME LINEAR PROGRAMMING APPLICATIONS TO STOCKAGE PROBLEMS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 15E.
AD-658 823 HC$3.00 MF$0.65

CROSSCORRELATION OF A MAXIMAL LENGTH BINARY SEQUENCE AND ITS SUBSEQUENCES.
Final rept.,
Rome Air Development Center Griffiss AFB N Y
Frederick D. Schmandt, Robert G. McLaughlin, and Jack K. Wolf. Aug 67, 39p Rept no. RADC-TR-67-261

Descriptors: (*Sequences, *Correlation techniques), Statistical functions, Coding, Information theory, Communication systems, Digital systems, Synchronization (Electronics).

One method of synchronizing a communication system uses the cross correlation between a maximal length pseudorandom, binary sequence and a portion of that sequence. Using only part of the sequence causes the correlation function to have peaks when the sequences are not aligned, and thus may cause a threshold decision scheme to synchronize incorrectly. This report describes several methods that compute the histogram of the correlation values for all unique integral bit shifts, using any maximal length sequence and any subsequence length. The report also derives exact analytical results for very short subsequences and for subsequences which are almost as long as the main sequence. The report shows that for any main sequence, if the subsequence length remains constant, the choice of the particular subsequence (within the main sequence) will have little effect on the histogram of the correlation values. Finally the report gives several analogies between the subsequence correlation problem and coding theory. (Author)
AD-658 839 HC$3.00 MF$0.65

OPTIMUM LINEAR INTERPOLATION OF SAMPLED FUNCTIONS,
Northeastern Univ Boston Mass Communication Theory Group
Martin Schetzen. 1 Apr 67, 73p Rept no. Scientific-1, 7
AFCRL-67-0407
Contract F19628-67-C-0112

Descriptors: (*Interpolation, *Sampling), Optimization, Information theory, Mathematical models, Statistical functions.

A study of linear interpolation of sampled random processes is presented in this report. A mathematical model of a sampler and of an interpolator are first developed. These models are used to derive general expressions for the mean-square interpolation error. The specific examples of zero- and first-order interpolation are used to illustrate the expressions. The problem of optimum interpolation is then formulated using the criterion that the mean-square error be a minimum. Explicit expressions for the optimum causal linear filter for interpolation using corrupted samples and expressions for the resulting minimum mean-square error are obtained. These results are illustrated by some specific examples of practical importance. A simple upper bound of the mean-square error is derived and a generalization of the sampling theorem for random functions is obtained by use of this bound. Although the important case of periodic sampling is emphasized in this report, the extension to a periodic sampling is given. (Author)
AD-658 862 HC$3.00 MF$0.65

LECTURE NOTES PREPARED IN CONNECTION WITH THE SUMMER SEMINAR ON MATHEMATICS OF THE DECISION SCIENCES

HELD AT STANFORD UNIVERSITY, STANFORD, CALIFORNIA, JULY 10 - AUGUST 11, 1967.
American Mathematical Society Providence R I
1967, 941p
Contract DA-31-124-ARO (D)-82, Grant Nonr (G)-00003-67

Descriptors: (*Operations research, Symposia), Mathematical programming, Optimization, Nonlinear programming, Economics, Control, Theory, Mathematical analysis, Networks, Graphics, Combinatorial analysis, Probability, Approximation (Mathematics), Stochastic processes, Reliability, Decision theory, Learning, Measurement, Psychophysics, Computer logic, Perception, Mathematics.

Contents: R. M. Thrall, Survey of mathematical programming; E. Polak, Necessary conditions of optimacity in control and programming; George B. Dantzig, Mathematical programming; Michel L. Balinski, Survey of mathematical programming; Terry Rockafellar, Nonlinear programming; Kenneth Arrow, Mathematical economics; David Gale, Mathematical economics; J. B. Rosen, Computational aspects of control theory; A. W. Tucker, Mathematical programming; Richard Cottle, Mathematical programming; D. R. Fulkerson, Networks and graphs; Jack Edmonds, Combinatorial methods; Ralph E. Gomory, Integer programming; Carlton Lemke, Mathematical programming; Arthur F. Veinott, Jr., Optimal inventory control; Donald L. Iglehart, Diffusion approximations in applied probability; Herman Chernoff, Optimal stochastic control; Richard E. Barlow, Reliability theory; Cyrus Derman, Markovian decision processes; M. Frank Norman, Learning theory; David Krantz, Measurement and psychophysics; Abraham Taub, Computer science; Andrze J. Ehrenfeucht, Perception problems.
AD-658 894 HC$3.00 MF$0.65

SERIES APPROXIMATIONS FOR OPTIMUM ZNL FILTERS,
Princeton Univ N J
For primary bibliographic entry see Field 9D.
AD-658 910 Not available from CFSTI.

APPLICATION OF BOOLEAN ALGEBRA TO ANALYSIS AND SIMULATION OF NETWORKS.
Technical rept.,
Army Electronics Command Fort Monmouth N J
Robert M. Dunn. Jul 67, 18p Rept no. ECOM-2856

Descriptors: (*Operations research, *Networks), (*Algebras, Operations research), Optimization, Simulation, Algorithms, Classification, Analysis, Transportation, Communication systems, Information retrieval.

An application of revised techniques of Boolean matrix algebra is made to network analysis and simulation. Two classes of networks are discussed -- transportation/communication and classification/information retrieval. The advantage of the technique is high-speed computation for relatively large networks, e.g., > 1,000 elements. (Author)
AD-658 980 HC$3.00 MF$0.65

MINIMUM-FUEL CONTROL OF SECOND-ORDER SYSTEMS WITH REAL POLES,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 22C.
AD-658 998 Not available from CFSTI.

NONLINEAR FILTERING: THE EXACT DYNAMICAL EQUATIONS SATISFIED BY THE CONDITIONAL MODE.
Revised ed.,
Brown Univ Providence R I Div of Applied Mathematics
Harold J. Kushner. 7 Feb 67, 8p
AFOSR-67-2178
Grants AF-AFOSR-693-66, NSF-GK-967
Revision of manuscript submitted 14 Sep 66. Research supported in part by NASA.
Availability: Published in IEEE Transactions on Automatic Control vAC12 n3 p262-7 Jun 1967.

Descriptors: (*Control systems, Mathematical programming), White noise, Stochastic processes, Differential equations.

The signal x sub t is a stochastic process satisfying the stochastic differential equation dx = f (x)dt+dz. Observations y = g (x)+xi are taken, where xi is white noise. The exact dynamical equation for the mode of the conditional density of x sub t is derived and discussed. (Author)
AD-659 016 Not available from CFSTI.

EXTREME POINTS OF LEONTIEF SUBSTITUTION SYSTEMS.
Stanford Univ Calif Dept of Operations Research
For primary bibliographic entry see Field 12A.
AD-659 045 HC$3.00 MF$0.65

THE JOINT DISTRIBUTION OF THE VIRTUAL WAITINGTIME AND THE RESIDUAL BUSY PERIOD FOR THE M/G/1 QUEUE,
Purdue Univ Lafayette Ind Dept of Statistics
Marcel F. Neuts. Aug 67, 16p Rept no. Mimeograph Ser-116
Contract Nonr-1100 (26)

Descriptors: (*Queueing theory, Functional analysis), Statistical functions, Integral transforms, Theorems, Poissons ratio.

In the M/G/1 queue, the joint distribution of the virtual waitingtime and the residual duration of the busy period at any time t, is given by a formula analogous to the one for the virtual waitingtime by itself. In the limit, as t approaches limit of infinity, the limiting joint distribution is given by a formula of the Pollaczek-Khintchine type. (Author)
AD-659 062 HC$3.00 MF$0.65

OPTIMAL DESIGNS ON TCHEBYCHEFF POINTS,
Purdue Univ Lafayette Ind Dept of Statistics
For primary bibliographic entry see Field 12A.
AD-659 064 HC$3.00 MF$0.65

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13A. Air Conditioning, Heating, Lighting, and Ventilating

DEVELOPMENT OF FLUIDIC LOGIC START-UP SYSTEM FOR MAIN FORCED DRAFT BLOWERS.
Naval Ship Engineering Center Philadelphia Pa Philadelphia Div
For primary bibliographic entry see Field 13G.
AD-658 499 HC$3.00 MF$0.65

ANGULAR AXIAL BLOWER,
Department of the Army Washington D C
M. A. Vereshchagin, A. I. Golubkov, and I. L. Teper. 21 Aug 67, 2p Rept no. J-2706
Uglovoi Osevoi Ventilyator, trans. of Patent (USSR) 178 013, appl. 933548/24-6, 15 Aug 64, pub. in Byulleten Izobretenni i Tovarnykh Znakov (USSR), n2 p1-2 1966.

Descriptors: (*Blowers, Liquid cooled), (*Shaft couplings, Thermal insulation), USSR, Patents, Shafts, Bearings, Cooling.

An angular axial blower is described with a cooled shaft and bearings for operation in a high-temperature gas medium, characterized by the fact that in order to decrease heating up of the bearings by heat transferred by the shaft, the latter is made in two parts connected by a corrugated insert washed by a lubricant placed between the blower vane and the front bearing in a water-cooled casing. (Author)
AD-658 532 HC$3.00 MF$0.65

VENTILATION REQUIREMENTS FOR GAS-PROOFING THE M-5 TANK,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 553 HC$3.00 MF$0.65

DISCUSSION OF VENTILATION REQUIREMENTS OF ARMORED VEHICLES,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 569 HC$3.00 MF$0.65

OPERATIONAL AND PHYSIOLOGICAL CHARACTERISTICS OF THE TANK T26E3, (M26).
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 594 HC$3.00 MF$0.65

PHYSIOLOGICAL CHARACTERISTICS OF THE T25E1-T26E1 TANK. CONTROL OF GUN FUME HAZARD,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 596 HC$3.00 MF$0.65

THE SINGLE-ENGINE CLAUDE CYCLE AS A 4.2K REFRIGERATOR.
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
For primary bibliographic entry see Field 20M.
NBS-TN-354 HC$0.45 MF$0.65

ELECTRICAL HEATER FOR LIQUID METALS AT ELEVATED TEMPERATURES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
G. Haskins, L. Hays, and D. Oconnor. 15 Aug 67, 24p NASA-CR-87994, JPL-TR-32-1146

Descriptors: *Heater, *Liquid metal, *Magnetohydrodynamic flow, Aluminum, Beryllium, Cesium, Conduction, Conversion, Electric, Flow, High temperature, Lithium, Magnetohydrodynamic, Oxide, Resistance, Strength, Stress, System.

For abstract, see STAR 05 21.
N67-35310 HC$3.00 MF$0.65

A PILOT PLANT STUDY OF LOW EXCESS AIR COMBUSTION - ITS EFFECT ON FIRESIDE PROBLEMS IN OIL-FIRED BOILERS.
Babcock and Wilcox Co., Alliance, Ohio. Research and Development Div.
For primary bibliographic entry see Field 13J.
PB-175 805 HC$3.00 MF$0.65

13B. Civil Engineering

A TECHNIQUE FOR MACROGEOMETRY TERRAIN ANALYSIS.
Interim rept.
Vanderbilt Univ Nashville Tenn Dept of Civil Engineering
1 Mar 63, 51p

Contract DA-22-079-eng-300
Original contains color, reproducible in black/white only after original supply is exhausted.

Descriptors: (*Terrain, Analysis), Surveying, Mapping, Geometry, Surfaces, Statistical analysis.

The purpose of this manual is to present a procedure for the analysis of terrain macrogeometry. Macrogeometry is defined as the gross topographic configuration of an area, and includes all attributes of the surface that are defined by the slope envelope generated by a 10-ft. contour interval. The results of such an analysis of the terrain provides one with a quantitative two-dimensional picture of the configuration of the area in question. (Author)
AD-658 655 HC$3.00 MF$0.65

AUTOMATIC COUNTING OF ATMOSPHERIC AEROSOLS COLLECTED WITH THE GOETZ ULTRACENTRIFUGE.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 4A.
AD-658 667 HC$3.00 MF$0.65

AIR POLLUTION ASTHMA IN OSAKA, JAPAN.
Yodogawa Christian Hospital Osaka (Japan)
For primary bibliographic entry see Field 6E.
AD-658 687 HC$3.00 MF$0.65

DETERMINATION OF PHYSICAL CRITERIA FOR ROADSIDE ENERGY CONVERSION SYSTEMS.
Cornell Aeronautical Lab., Buffalo, N. Y.
For primary bibliographic entry see Field 13L.
PB-175 919 HC$3.00 MF$0.65

DESIGN AND DEVELOPMENT OF ULTRASONIC SCOUR METER MODEL 1055.
Final rept.
Automation Industries, Inc., Boulder, Colo. Research Lab.
1966, 87p TR-67-35
Contract CPR-11-2851
See also PB-175 921.

Descriptors: (*Erosion, *Meters), Bridges, Rivers, Probes, Ultrasonic radiation, Hydrology, Bubbles, Sedimentation, Electroacoustic transducers, Feasibility studies, Circuits, Positioning devices (Machinery), Packaging.
Identifiers: Scour meters.

Consideration is given to hydraulic problems such as turbulence, air bubbles, sediment concentrations and temperature gradients. Transducer directivity patterns were studied, and various electronic circuits and mechanical positioning devices for the transducer were considered. The report describes the units produced during development of the instrument and their mechanical packaging. Plant and field tests of the scour meter are described, and the capabilities and limitations of the equipment are discussed.
PB-175 920 HC$3.00 MF$0.65

OPERATION AND MAINTENANCE MANUAL FOR ULTRASONIC SCOUR METER MODEL 1055, APPENDIX B.
Automation Industries, Inc., Boulder, Colo. Research Lab.
1966, 48p TM-66-52
Contract CPR-11-2851
See also PB-175 920.

Descriptors: (*Erosion, *Meters), Instruction manuals, Maintenance.
Identifiers: Scour meters.

Contents: General information; Operation; Theory of operation; Transducer-controller unit; Disassembly of mechanical unit; Data reduction.
PB-175 921 HC$3.00 MF$0.65

INTERSECTION SIMULATION MODEL VALIDATION. PART I.
Traffic Research Corp., San Francisco, Calif.
Dec 66, 215p
Contract CPR-11-2863
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. See also Part 2, PB-175 923.

Descriptors: (*Traffic, Models (Simulations)), (*Vehicles, Urban areas), Motor vehicle operators, Real time, Mathematical models, Punched cards, Bibliographies, Performance (Engineering), Site selection, Computers, Urban planning.

The primary objective of this study is to validate the best intersection simulation models available and their components. An exhaustive search was done to determine the models that were available when the study began. From the available models, four of them were selected for detailed validation. The selected models were: (1) NCHRP Model by D. L. Gerlough and F. A. Wagner; (2) LEWIS Model by R. M. Lewis and H. L. Michaels; (3) SIGAL Model by J. H. Kell; and (4) BLEYL Model by R. L. Bleyl. The output of the four models was compared initially simulating an orthogonal intersection with one-lane approaches. Then, data from field studies made in the San Francisco Bay Area and in Toronto were used to validate the models and their components. The validation studies fell short of providing the complete answer to the question of whether or not the models are valid. They did, however, provide valuable insight into the capabilities and shortcomings of each model. Those studies have shown that each of the models has certain favorable attributes, but all have difinite limitations. No one was considered to be ideal or even adequate for all needs. The author recommends that the major effort in simulation be directed toward the development of an entirely new model that must be capable of simulating satisfactorily a wide variety of intersections.
PB-175 922 HC$3.00 MF$0.65

INTERSECTION SIMULATION MODEL VALIDATION. PART 2.
Traffic Research Corp., San Francisco, Calif.
Dec 66, 89p
Contract CPR-11-2863
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. See also PB-175 922.

Descriptors: (*Traffic, Models (Simulations)), (*Vehicles, Urban areas), Acceleration, Deceleration, Instrumentation, Flow charting, Velocity, Site selection, Computer programs, Punched cards, Urban planning.

The section of the report on simulation model validation describes the details of the field studies made to validate the four simulation models chosen for thorough analysis. Study sites, field equipment placement, personnel deployment, and data reduction techniques are explained in detail. Throughout the field studies, sites were chosen which closely resembled the intersections simulated by the four models. Suitable sites were located with the assistance of various city traffic engineering offices and through extensive search. Other important factors in the selection were traffic volumes and turn patterns, the intersection geometry, parking conditions, pedestrian interference, and the characteristics of any traffic control devices influencing movement.
PB-175 923 HC$3.00 MF$0.65

DEVELOPMENT OF INSTRUMENT FOR NON-DESTRUCTIVE MEASUREMENT FOR CONCRETE PAVEMENT THICKNESS.
Departmental research rept.,
Texas Highway Dept. Materials and Tests Div.
Joe R. Canfield, and Willard H. Moore. Jun 67, 39p RR-61-1F
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Pavements, *Concrete), (*Nondestructive testing, *Ultrasonic radiation), Thickness, Oscilloscopes, Electronic equipment, Transducers, Reflection, Instrumentation, Acoustic impedance.

The study sought to develop a non-destructive method of measuring thickness of concrete pavement using ultrasonic devices. Much of the difficulty of building such a device was found to lie with transducer development. No practical instrument has yet been perfected.
PB-175 948 HC$3.00 MF$0.65

ANALYTICAL AND EXPERIMENTAL STUDY OF A THROUGH TRUSS BRIDGE.
Progress rept.,
Maryland Univ., College Park. Dept. of Civil Engineering.
Rymantas A. Svotelis, Conrad P. Heins, Jr., and Charles T. G. Looney. Jun 67, 217p Rept. no. 0919
Rept. on Study of Effect of New Vehicle Weight Law on Structures. Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bridges, Structures), (*Loading (Mechanics), Bridges), Strain (Mechanics), Deflection, Weight, Traffic, Structural parts, Rivers, Stresses, Instrumentation, Measurement, Passenger vehicles, Computers, Floors, Captive tests, Design, Concrete, Tests, Tables.

The report presents the results of a field test on a through truss bridge. Both static and moving load tests were made, but only static test results are presented. The bridge was instrumented with numerous strain and deflection gages on the main truss members as well as on floorbeams, stringers, and on the concrete deck. Previously developed analytical techniques were used to relate theoretical and design assumptions to measured strains and deflections. In one technique, the truss was analyzed as an orthotropic plate. The plate equations were solved using a finite difference method. Various changes in the actual bridge configuration has to be made in order to be compatible with certain limitations of the analytical method. In general, measured strains in the bottom of stringers compared favorably with analytical values, but analytical floorbeam strains, although having in general the same distribution shape, were appreciably lower than corresponding measured values. analytical and measured deflections have better agreement. Measured strains and deflections were always much lower than design values. (Author)
PB-175 949 HC$3.00 MF$0.65

SUBGRADE MOISTURE VARIATIONS. A PRELIMINARY STANDARDIZATION AND CALIBRATION PROCEDURE FOR NUCLEAR DEPTH MOISTURE/DENSITY GAGES.
Oklahoma State Univ., Stillwater. School of Civil Engineering.
For primary bibliographic entry see Field 14B.
PB-175 950 HC$3.00 MF$0.65

CONSTRUCTION AGGREGATE AVAILABILITY STUDY. SUMMARY REPORT: HIGHWAY DISTRICT IV,
Connecticut Highway Dept. Soils and Foundations Div.
For primary bibliographic entry see Field 13C.
PB-176 057 HC$3.00 MF$0.65

THE STATISTICAL APPROACH TO QUALITY CONTROL IN HIGHWAY CONSTRUCTION.

Bureau of Public Roads, Washington, D. C.
Apr 65, 48p

Descriptors: (*Roads, Construction), (*Pavements, Quality control), Construction materials, Sampling, Asphalt, Concrete, Cements, Thickness, Computer programs, Analysis of variance.

The publication is intended to assist State highway departments in planning research programs to establish quantitative values of statistical parameters for highway materials and processes. These parameters are needed to apply statistical concepts to quality control in highway construction. The publication includes background information concerning the development of an overall plan for application of the statistical approach to quality control in highway construction. To avoid misunderstanding, it must be emphasized that the relatively large amount of sampling and testing required in this research program to establish significant parameters involved will not be required when specifications are based on statistical concepts. The methods of application of statistical principles to specific control problems in highway construction have not, as yet, been selected. In certain cases, it is likely that present control practices will be continued, whereas, in other cases, a different system of control employing considerably reduced number of tests may be adequate. However, a new concept of interpretation of test results then will be necessary.
PB-176 059 HC$3.00 MF$0.65

SOME RECENT FINDINGS IN FLEXIBLE PAVEMENT RESEARCH.
Research rept.,
Texas Transportation Inst., College Station.
F. H. Scrivner, and W. M. Moore. Jul 67, 51p
RR-32-9
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Pavements, Roads), (*Test facilities, Roads), Traffic, Weather, Thickness, Deflection, Materials, Design, Tables, Degradation, Texas.

The report is based on research done in connection with the study, 'Application of the AASHO Road Test Results to Texas Conditions.' It is concerned primarily with two of the original study objectives as follows: In general, to correlate the average level of pavement performance determined from a two-year controlled traffic test (the AASHO Road Test) with performance of Texas pavements under normal mixed traffic, and to study the effect of weather and the so-called regional effect throughout the state. For flexible pavements in Texas, to determine approximate values (or a range of values) of coefficients for representing Texas materials to replace the layer coefficients determined at the AASHO Road Test for materials used there, and to develop relationships between these coefficients and materials tests. The new approach involves the assumption that load-induced deflections of the pavement surface are an index to the potential rate of pavement deterioration. The results reported include: development of an empirical equation for estimating deflections from thickness and laboratory-determined strength of the pavement structure materials, and use of the equation, together with deflections observed on 323 highway test sections, to evaluate the regional effect. The equation presumably could be used in the design of flexible pavements if deflection criteria were made a part of the design procedure, and if the underlying causes of the regional effect were known. (Author)
PB-176 060 HC$3.00 MF$0.65

AN EVALUATION OF TERMINAL ANCHORAGE INSTALLATIONS ON RIGID PAVEMENTS.
Departmental Research rept.,
Texas Highway Dept. Highway Design Div.
B. F. McCullough, and T. F. Sewell. Sep 66, 42p
RR-39-4F
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Pavements, *Reinforced concrete), (*Anchors (Structural), Pavements), Friction, Temperature, Bridges, Soils, Roads, Texas.

In 1959 the Texas Highway Department began constructing jointed concrete pavements (JCP) with lug-type terminal anchorages in an effort to prevent overpass or bridge structures from being damaged by excessive pressures associated with the progressive outward movement of these pavements. The report, the final of a series of four, summarizes the results of a 3 1/2-year study of the performance of the terminal anchorage systems. The study included 152 anchorage systems on JCP and 186 systems on CRCP. The report places major emphasis on the effects of pavement age, pavement length, percent grade, subbase type, number of lugs and environmental location on CRCP anchorage systems and the development of an empirical equation for CRCP which expresses end movement in terms of number of lugs, percent grade, subbase coefficient of friction, air temperature and length of pavement contributing to end movement. The findings of the study indicate that a terminal anchorage system such as used by the Texas Highway Department is a feasible method for preventing pavement volume change from damaging structures. Some twenty failures were experienced with JCP anchorage systems due to a deficiency in transferring the pavement growth forces to the soil mass. A new feature was incorporated in the anchorage system to offset this deficiency. The end movement of CRCP was found to be directly related to temperature change and pavement length up to 1,000 feet, and inversely related to number of lugs, percent grade and subbase friction. The empirical equation derived for CRCP can be used as a design guide for determining the number of lugs required for a particular terminal anchorage system.
PB-176 064 HC$3.00 MF$0.65

STATISTICAL ANALYSIS OF HEAVY TRUCK TRAFFIC FOR THE STATE OF MARYLAND.
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13F.
PB-176 065 HC$3.00 MF$0.65

A STUDY OF AIRSPACE UTILIZATION,
Real Estate Research Corp., Los Angeles, Calif.
Edward T. Leutheuser, and T. Layden Cook. 15 Mar 67, 226p
Prepared in cooperation with California State Div. of Highways, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Economics), (*Buildings, Roads), Cost effectiveness, Urban areas, Construction, Law, Management engineering, Feasibility studies, California.

The study examines the nature of air rights, the economic and social impact of using air space, and the administrative problems involved in coordinating the use of air space. The analysis includes examination of existing experience with air space use to determine the extent to which this experience is relevant for California. For example, costs of developing air rights are related to land values to provide some indication as to the feasibility of developing air rights. Costs are typically $15 to $20 per square foot of platform for a 10 story building over a highway. This would suggest that such air rights developments might be suitable in areas where land values exceed $15 or $20 per square foot (e.g., $600,000+ per acre). In West Coast cities, this occurs only in CBD's of large cities. For example, in Los Angeles values range up to $100 per square foot and in San Francisco up to $150 ($6 million per acre). The report also recognizes that air rights may at times be used for noneconomic reasons (e.g., prestige). The report suggests that 'profitable and beneficial' multiple use can be made of freeway rights-of-way but also calls attention to such matters as financing and coordination problems during extended periods of construction, and the problem of obsolete or abandoned structures because airspace projects typically have shorter lives than highways. (Author)
PB-176 069 HC$3.00 MF$0.65

INSULATION OF BRIDGE DECKS FOR ICE PREVENTION AND REDUCTION OF FREEZE-THAW CYCLES.
Texas Highway Dept. Bridge Div.
For primary bibliographic entry see Field 13M.
PB-176 076 HC$3.00 MF$0.65

VIRGINIA PILE MANUAL. VOLUME II. PILE DRIVING RECORDS,
Virginia Univ., Charlottesville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13M.
PB-176 077 HC$3.00 MF$0.65

VIRGINIA PILE MANUAL. VOLUME I. GENERAL INFORMATION,
Virginia Univ., Charlottesville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13M.
PB-176 078 HC$3.00 MF$0.65

A COMPARISON OF 1-1/2-INCH AND 3/4-INCH MAXIMUM SIZE AGGREGATE IN CONCRETE.
California State Div. of Highways. Materials and Research Dept.
For primary bibliographic entry see Field 11B.
PB-176 101 HC$3.00 MF$0.65

INTERIM REPORT ON ROADSIDE SIGN VISIBILITY.
Research rept.,
Texas Transportation Inst., College Station.
Ned E. Walton, and Neilon J. Rowan. Jun 67, 42p
RR-75-3
Research supported in part by Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Signals), (*Signals, *Visibility), Measurement, Brightness, Lighting equipment, Portable, Illumination, Texas.

The report presents sign visibility measurements as they are effected by luminaire mounting height, and lateral position. The luminaires were mounted on seven portable towers to represent a one-side lighting system, using 400-watt mercury luminaires. Mounting heights of 30 and 40 feet were studied for comparison purposes. The sign selected for this study was a typical destination sign with black painted letters on a reflectorized white background. The following conclusions were reached: The 40 foot mounting height of luminaires improves the distribution of light in a continuous illumination system. The 40-ft. mounting height provides an increase in legibility distance of approximately 12 percent. The effect of headlight condition on sign legibility is less for 40-foot mounting height than for 30-foot mounting height. For best legibility roadside signs should be placed directly in line with the luminaires at a longitudinal position of 20 to 60 feet beyond the luminaire as viewed by the driver. The longitudinal position is not critical for the 40-foot mounting height. The 40-foot mounting height results in a system of lower sign brightness and disability veiling brightness levels. Legibility and roadside signs can be related to brightness contrast and glare. (Author)
PB-176 103 HC$3.00 MF$0.65

EPOXY BONDED COMPOSITE T-BEAMS FOR HIGHWAY BRIDGES.

Arizona Univ., Tucson. Engineering Experiment Station.
For primary bibliographic entry see Field 13M.
PB-176 107 HC$3.00 MF$0.65

DISCRETE ANALYSIS OF CONTINUOUS FOLDED PLATES,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13M.
PB-176 124 HC$3.00 MF$0.65

13C. Construction Equipment Materials, and Supplies

CEMENT PERFORMANCE IN CONCRETE.
Army Engineer Waterways Experiment Station Vicksburg Miss
For primary bibliographic entry see Field 11B.
AD-658 732 MF$0.65

AN INVESTIGATION OF AGGREGATE-ASPHALT ADHESION BY MEASUREMENT OF HEATS OF IMMERSION.
Progress rept. (Phase 1),
Montana Coll. of Mineral Science and Technology, Butte.
Keith Ensley, and Henry Schelz. 28 Jun 67, 26p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Asphalt, Adhesion), (*Quartz, Bonding), Heat of vaporization, Heat sinks, Thermodynamics, Calorimeters, Cements, Thermocouples, Adsorption, Thermal analysis.

The report is a summary of progress achieved during the first phase of a study of binding phenomena in aggregate-asphalt systems utilizing immersional thermodynamics principles mainly through measurements of heats of immersion by microcalorimetry. To date, a single aggregate-asphalt system consisting of an asphalt cement and a pure quartz, size 35M + 48M has been studied. Details are given of the accessory equipment, the microcalorimeter developed and the procedure used in measuring heat of immersion of the aggregate in the asphalt. Heat of immersion is expressed in microcalories, per second, per gram of aggregate. Heat of immersion curves are given for three test runs over three time periods. The curves show initial sharp peaks in the initial stages after immersion followed by a tailing off to low levels of energy release. It is claimed that the sharp initial peak represents the adhesion phenomenon and is proportional to the strength of the bond developed at the aggregate-asphalt interface. It is also contended that the tail portion of the curve reflects cohesion and is believed to be a function of the asphalt only.
PB-175 933 HC$3.00 MF$0.65

PREDICTION OF CREEP IN STRUCTURAL CONCRETE.
Illinois Univ., Urbana. Dept. of Theoretical and Applied Mechanics.
For primary bibliographic entry see Field 20K.
PB-176 026 HC$3.00 MF$0.65

CONSTRUCTION AGGREGATE AVAILABILITY STUDY. SUMMARY REPORT: HIGHWAY DISTRICT IV,
Connecticut Highway Dept. Soils and Foundations Div.
Donald R. Spalding. 1966, 116p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Construction), (*Construction materials, Connecticut), Sand, Gravel, Deposits, Sources, Rock (Geology), Maps, Costs, Production, Consumption, Terrain, Urban areas, Public Relations.

The town report contains information on materials (landform, characteristics and quality of the material), acreage and depth of each deposit, quantity of sand-gravel (acre-feet) in each deposit, property status (land use, existing pits, etc.) and remarks about potentiality of source and acquisition or accessibility. The summary report states that District IV contains 508,000,000 cu. yd. of 'actually or potentially available sand and gravel.' These materials are found primarily in glacio-fluvial deposits (ice-marginal stratified drift, outwash, terraces, alluvium, etc.). They are derived predominantly from hard metamorphic or granitic bedrock and are of excellent quality. A review of Highway Department costs for aggregates in 1948-66 shows that there has been a general upward trend in unit cost. The economic, social and legal aspects of sand and gravel exploitation are discussed, which is of particular importance in urban areas. Depletion trends due to aggregate usage, as well as reduction in availability due to changes in land use, are discussed. Recommendations are made that the Highway Department: (1) seek legal means of assuring an adequate quantity of aggregates for a long-range highway construction, (2) mount a public relations effort to impress on the public and zoning officials the need for continued availability of aggregates; and (3) encourage the optimum use of lower quality local aggregates in structures not requiring the highest quality aggregates where economically feasible.
PB-176 057 HC$3.00 MF$0.65

PHYSICAL TESTING OF MECHANICALLY SPLICED REINFORCING BAR USING A SLEEVE WITH METAL FILLER PROCESS.
Research rept.,
California State Div. of Highways.
Eric F. Nordlin, Paul G. Jonas, and Dennis L. Scharosch. Jul 67, 80p M/R-636328
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Reinforcing materials, *Joints), Reinforced concrete, Rods, Mechanical fasteners, Tensile properties, Fatigue (Mechanics), Loading (Mechanics), Acceptability.

The use of a mechanical reinforcing steel bar coupler utilizing a sleeve with metal filler process is discussed. Joining large size (e.g. 14s and 18s) reinforcing steel bar by welding is presently the only acceptable procedure allowed by the California Division of Highways. An appreciable economic savings can be realized when substituting mechanical splices in place of welded splices; however, extreme caution must be exercised by the designer prior to accepting mechanical splices. (Author)
PB-176 058 HC$3.00 MF$0.65

THE STATISTICAL APPROACH TO QUALITY CONTROL IN HIGHWAY CONSTRUCTION.
Bureau of Public Roads, Washington, D. C.
For primary bibliographic entry see Field 13B.
PB-176 059 HC$3.00 MF$0.65

INFLUENCE OF BEAM SIZE ON THE SHEARING FRACTURE OF MORTAR AND CONCRETE BEAMS,
Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
For primary bibliographic entry see Field 13M.
PB-176 072 HC$3.00 MF$0.65

13D. Containers and Packaging

RELATIONSHIP OF WVTR TO WATER VAPOR PRESSURE AS A DETERMINANT IN PREDICTING PACKAGE LIFE,
Naval Air Material Center Philadelphia Pa Aeronautical Materials Lab
D. Minuti. 30 Jun 67, 45p Rept no. NAEC-AML-2625

Descriptors: (*Packaging, Life expectancy), (*Containers, Permeability), Water vapor, Vapor pressure, Membranes, Plastics, Penetration, Desiccants, Nomographs.

A series of water vapor transmission rates were determined for a number of flexible barriers over a range of temperatures and humidities. The results obtained were used to provide a basis for establishing an empirical formula permitting the extrapolation of water vapor transmission rates of permeable barriers for any given temperature and humidity encountered in normal shipment and storage. This relationship provides a more meaningful method of estimating the minimum life of a pack as indicated by correlation with laboratory simulated outdoor exposures. Nomographs based on this formula were developed to estimate minimum pack, maximum WVTR, or quantity of desiccant required. (Author)
AD-658 748 HC$3.00 MF$0.65

LONG TERM STORAGE EXPERIMENTAL PROGRAM - ANNUAL TEARDOWN INSPECTION, ERIE ORDNANCE DEPOT, 20 JUNE TO 1 JULY 1949.
Frankford Arsenal Philadelphia Pa Pitman-Dunn Research Labs
For primary bibliographic entry see Field 15E.
AD-658 984 HC$3.00 MF$0.65

LIQUID SLOSHING IN ELASTIC CONTAINERS.
Georgia Inst. of Tech., Atlanta.
For primary bibliographic entry see Field 20D.
For abstract, see STAR 05 21.
N67-35758 HC$3.00 MF$0.65

13E. Couplings, Fittings, Fasteners, and Joints

PHYSICAL TESTING OF MECHANICALLY SPLICED REINFORCING BAR USING A SLEEVE WITH METAL FILLER PROCESS.
California State Div. of Highways.
For primary bibliographic entry see Field 13C.
PB-176 058 HC$3.00 MF$0.65

13F. Ground Transportation Equipment

SEAT CUSHIONS FOR TRUCK (4 x 4) 1/4 TON (PEEP),
Army Medical Research Lab Fort Knox Ky
Lester B. Roberts, and James W. Gregg. 17 Oct 45, 15p
Rept. on proj. 'Seating Designing and Placing in Relation to Fatigue.'

Descriptors: (*Cargo vehicles, Seats), Fatigue (Physiology), Human engineering, Design.

The seat cushion under consideration, installed in a peep, results in improved riding comfort and reduced fatigue for driver and occupants. The seat cushion requires little modifications to adapt it for installation in peep.
AD-658 601 HC$3.00 MF$0.65

A SUGGESTED PROCEDURE FOR THE SELECTION AND DESCRIPTION OF REFERENCE TEST AREAS,
Army Engineer Waterways Experiment Station Vicksburg Miss
Warren E. Grabau. Aug 67, 31p Rept no. Miscellaneous Paper-4-921

Descriptors: (*Vehicles, Environmental tests), (*Armed forces transportation, *Terrain), (*Soil mechanics, *Trafficability), Maps, Photogrammetry, Photointerpretation, Mathematical prediction, Mobility, Performance (Engineering).

A procedure is presented for the selection and description of reference test areas (RTA's) in which the Quadripartite nations can test and evaluate their military vehicles. The procedure consists of four phases: (a) Selection of areas of national interest by each of the Quadripartite nations. (b) Identification and description of the facets comprising the areas of national interest. (c) Selection of RTA's within each member nation in a location which exhibits the maximum number of facet types as found in the areas of national interest. (d) Description of all RTA's in terms of landscape pattern, facet and subfacet composition, factor value ranges characterizing each facet and subfacet, and factor values mapped independently. The factor value descriptions must be in terms of ranges of values for those factors which significantly affect vehicle performance. The factors are hypothesized to be: (a) Soil factors: soil mass strength, soil surface strength. (b) Vertical obstacles: macroslope, step height, width, length, spacing, approach angle, soil mass strength. (c) Lateral obstacles: spacing, stem spread, branching height, clustering index. (d) Longitudinal obstacles: spacing, stem diameter, bending strength, clustering, soil mass strength. (e) Water-land interface: depth, approach angle, current velocity.
AD-658 659 HC$3.00 MF$0.65

GLOSSARY OF AUTOMOTIVE AND VEHICLE MAINTENANCE TERMS. ENGLISH-VIETNAMESE, VIETNAMESE-ENGLISH. FIRST EDITION (Tu Dien Quan Xa. Anh-Viet, Viet-Anh. Xuat Ban Lan Thu Nhat).
Military Assistance Command Vietnam San Francisco Calif 96222 Training Aids Div
For primary bibliographic entry see Field 5B.
AD-658 664 HC$3.00 MF$0.65

COMMUNICATIONS OR TRANSPORT: DECISION-MAKING IN DEVELOPING COUNTRIES.
Massachusetts Inst of Tech Cambridge Center for International Studies
For primary bibliographic entry see Field 17B.
AD-658 816 HC$3.00 MF$0.65

INFLUENCE OF THE SUSPENSION FORCES AND SUPPORTING SPRING FORCES ON THE RUNNING BEHAVIOR OF FREE SETS OF STEERING WHEELS IN THE STRAIGHT TRACK. TEXT VOLUME (ACCOMPANYING PICTURE VOLUME).
Einfluss Der Gehaenge- Und Tragfederkraefte Auf Das Laufverhalten Freier Lenkradsaetze Im Geraden Gleis
Technische Hochschule Munchen (West Germany). Fakultaet Fur Maschinenwesen Und Elektrotechnik.
G.-P. Bracker. 1966, 96p
in German

Descriptors: *Rail transportation, *Suspension system, *Wheel, Automobile, Bearing, Coefficient, Dynamics, Effect, Friction, Motion, Rail, Run, Spring, Straight, Suspension, System, Track, Transportation.

For abstract, see STAR 05 21.
N67-35951 HC$3.00 MF$0.65

INTERSECTION SIMULATION MODEL VALIDATION. PART I.
Traffic Research Corp., San Francisco, Calif.
For primary bibliographic entry see Field 13B.
PB-175 922 HC$3.00 MF$0.65

INTERSECTION SIMULATION MODEL VALIDATION. PART 2.
Traffic Research Corp., San Francisco, Calif.
For primary bibliographic entry see Field 13B.
PB-175 923 HC$3.00 MF$0.65

DEMONSTRATION REPORT COVERING 1000 VOLT D.C. CHOPPER CONTROL SYSTEM WITH TYPE 1459 MOTORS AND 4160 VOLT - 3 PHASE - 60 CYCLES A.C. VARITRAN CONTROL SYSTEM WITH TYPE 1459-T TANDEM MOTOR UNITS.
Westinghouse Electric Corp., Pittsburgh, Pa. Transportation Div.
For primary bibliographic entry see Field 21C.
PB-175 924 HC$3.00 MF$0.65

WASHINGTON, D. C. 1980 RAIL RAPID TRANSIT PATRONAGE FORECASTS.
Voorhees (Alan M.) and Associates, Inc., McLean, Va.
Jul 67, 137p
Contract NTA-66-2
Prepared in cooperation with National Capital Transportation Agency, Washington, D. C.

Descriptors: (*Transportation, District of Columbia), (*Passenger vehicles, *Traffic), Government employees, Predictions, Accuracy, Costs, Population, Employment, Economics.

Rail rapid transit has been recognized as an essential ingredient in the total transportation system required to serve the Washington Metropolitan Area. The National Capital Transportation Agency, formed in 1960 to establish and maintain a transit development program, has been authorized by the Congress of the United States to proceed with final design and construction of a 25-mile rail rapid transit system. This report provides independent estimates of the patronage which would be attracted by the authorized system rail rapid transit lines. Also contained in this report are patronage estimates for the proposed revision of the authorized system known as the modified system.
PB-175 929 HC$3.00 MF$0.65

DIABLO TEST TRACK NOISE AND VIBRATION MEASUREMENTS.
Technical rept.,
Wilson, Ihrig and Associates, Inc., Berkeley, Calif.
George Paul Wilson. Jun 67, 55p
Prepared in cooperation with Department of Housing and Urban Development, Washington, D. C.

Descriptors: (*Railroad tracks, *Noise), (*Vibration, Measurement), Mechanical fasteners, Performance (Engineering), Accelerometers, Sound, Maps, Tables, Instrumentation, California.

The report presents results of sound and vibration level measurements taken at the Diablo Test Track of the San Francisco Bay Area Rapid Transit System. The primary objective of these tests was to compare the performance of prototype rail fasteners with regard to wayside noise level and mechanical vibration isolation. Secondary objectives of the tests included performing measurements intended to show the relative contributions of the wheel-rail system and the propulsion system to the wayside noise and performing measurements in and beneath the cars to show the effect of different types of roadbed on the noise. Also, the evaluation of the sound barrier wall was expanded, from that presented in October, 1966, by the use of a longer barrier wall, measurements with three laboratory cars, and measurements with the car passing by on the track on the opposite side of the aerial structure, away from the wall. (Author)
PB-175 935 HC$3.00 MF$0.65

PERFORMANCE DEMONSTRATION OF THE ALTERNATING CURRENT PROPULSION SYSTEM.
Allis (Louis) Co., Milwaukee, Wis.
For primary bibliographic entry see Field 21C.
PB-175 936 HC$3.00 MF$0.65

A-C PROPULSION SYSTEM FOR BARTD RAIL CAR APPLICATION.
Garrett Corp., Los Angeles, Calif. AIResearch Mfg. Div.
For primary bibliographic entry see Field 21C.
PB-175 961 HC$3.00 MF$0.65

STATISTICAL ANALYSIS OF HEAVY TRUCK TRAFFIC FOR THE STATE OF MARYLAND.
Progress rept.,
Maryland Univ., College Park. Dept. of Civil Engineering.
C. A. Pryor, Jr., C. P. Heins, Jr., and C. T. G. Looney. Jun 67, 221p
Prepared in cooperation with Maryland State Roads Commission, and Bureau of Public Roads, Washington, D. C. Report on project Study of Effect of New Vehicle Weight Law on Structures.

Descriptors: (*Vehicles, Load distribution), (*Axle shafts, Weight), Traffic, Statistical analysis, Computer programs, Bridges, Stresses, Deflection, Vehicle chassis components, Civil engineering.

The report presents the results of a statistical study of the truck weight records in the State of Maryland for the years 1955 through 1964. The data is presented in various ways, according to truck types, weight distribution to axles, and gross weight. Comparisons are made with previous work by others. The most significant observation noted in the study is the general increase in gross weights of trucks over the study period, with the exception of truck type 2S-1. Based on the study, some typical trucks for each classification are proposed.
PB-176 065 HC$3.00 MF$0.65

ANALYSIS AND EVALUATION REPORT. COMMUTA-CODE AUTOMATIC FARE COLLECTION EQUIPMENT.
General Electric Co., Somersworth, N. H. Meter Dept.
Dec 66, 32p DF66WM-17
Prepared in cooperation with Department of Housing and Urban Development, Washington, D. C.

Descriptors: (*Railroads, *Automation), Money, Questionnaires, Economics, Control systems, Effectiveness, Reliability (Electronics), Costs, Public opinion, California.

In recent years, there has been increasing evidence that rapid transit systems of the future will charge individual passengers differing fares, depending on the length of ride. The Bay Area Rapid Transit's intent to operate under a graduated fare structure with automatic fare collection equipment is a pioneering step, one promising heavy impact on the future of the rapid transit industry and its rate philosphy. The equipment intended for usage in this first rapid transit application should therefore promise the optimum in reliability, convenience and cost. In order to help achieve this goal, the General Electric Company - starting with study efforts beginning in 1959 - developed its Commuta-Code system of automatic fare collection. It was subsequently agreed by BART, its Engineers, and GE that it would be useful to demonstrate and evaluate the operation of prototype Commuta-Code equipment which had been carefully specified and designed for BART application. (Author)
PB-176 097 HC$3.00 MF$0.65

ANALYSIS AND EVALUATION OF BAY AREA RAPID TRANSIT SELF-SERVICE FARE COLLECTION SYSTEM DEMONSTRATION.
FMC Corp., Santa Clara, Calif. Machinery/Systems Group.

Sep 67, 84p R-2601
Prepared in cooperation with Control Data Corp., Minneapolis, Minn. Research supported in part by Department of Housing and Urban Development, Washington, D. C.

Descriptors: (*Railroads, Automation), Money, Human engineering, Questionnaires, Multiplex, Control systems, Magnetic tape, Time, Computers.

The report contains the development of a concept for the Bay Area Rapid Transit (BART) Self-Service Fare Collection System by which a graduated fare could be collected. The concept included a general purpose central computer system operating over telephone lines. Objectives of the demonstration were to observe passenger reactions to the station equipment and instructions, the rate of flow, and equipment malfunctions, as well as to assess the capability of the central computer to control fare collection activities. Among the possible features of the central computer system are: Automatic management information reports, Instant knowledge of commuter traffic, Instant train scheduling information, Automatic recording of malfunctions, Credit card option, Future expansion capability. (Author)
PB-176 098 HC$3.00 MF$0.65

13G. Hydraulic and Pneumatic Equipment

DEVELOPMENT OF FLUIDIC LOGIC START-UP SYSTEM FOR MAIN FORCED DRAFT BLOWERS.
Final rept.,
Naval Ship Engineering Center Philadelphia Pa Philadelphia Div
W. L. Smith. 22 May 67, 22p Rept no. NAVSEC-PHILADIV-C-8-II

Descriptors: (*Blowers, Starting), (*Fluidics, Control systems), Automatic, Digital systems, Logic circuits, Performance (Engineering), Design.

A pure fluid automatic start-up system for main forced draft blowers was designed. A breadboard system was developed and evaluated to determine performance characteristics and suitability for naval use in the automatic start-up of auxiliary turbine driven machinery. The breadboard system was constructed from fluidic logic devices. Tests to evaluate the system were conducted with the aid of an analog computer simulation of a main forced draft blower and associated equipment. The results of these tests indicated that a digital logic system constructed of bi-stable fluidic devices could perform satisfactorily the operations required in lighting-off a forced draft blower and bringing it to a condition suitable for transfer to control by an analog control system. (Author)
AD-658 499 HC$3.00 MF$0.65

APPLICATION OF THE HYDRAULIC ANALOGY TO INTERNAL SUBSONIC FLOW,
Army Missile Command Redstone Arsenal Ala
Army Inertial Guidance and Control Lab and Center
For primary bibliographic entry see Field 20D.
AD-658 669 HC$3.00 MF$0.65

13H. Industrial Processes

PROPERTIES OF SEVERAL STRUCTURAL U-Mo-Cb-V-Ti ALLOYS.
Army Materials Research Agency Watertown Mass
For primary bibliographic entry see Field 11F.
AD-658 679 HC$3.00 MF$0.65

PARTICLE BOMBARDMENT BONDING AND WELDING INVESTIGATION.
Rept. no. 8, 15 Dec 64-15 Mar 67 (Final),
Heil Scientific Labs Inc Belmont Calif
Oskar Heil. 1967, 202p
ECOM-00429-F
Contract DA-28-043-AMC-00429 (E)
See also AD-474 752.

Descriptors: (*Sputtering, Dielectrics), (*Metal coatings, Sputtering), Waveguide windows, Particle beams, Welding, Bonding, Metal seals, Ceramic materials, Ferrites, Beryllium, Mercury, Copper, Silver, Aluminum, Titanium, Molybdenum, Tungsten, Nickel, Stresses, Brazing, Films, Alumina, Chromium, Zirconium, Glass, Vanadium, Niobium, Stainless steel, Molybdenum alloys, Tungsten alloys, Nickel alloys, Chromium alloys, Tensile properties, Plasma medium.

Particle bombardment chemistry and thermal chemistry are compared. Particle bombardment techniques for crystal growth welding and bonding are discussed. The nine different sputter arrangements used in this study for producing ion bombardment bonded coatings are described. All of them use high frequency energy for plasma generation and most of them utilize magnetic plasma confinement. Combinations of the following insulating materials and metals have been particle bombardment bonded, vacuum brazed or pressure sealed and tested for tensile strength. Insulating Materials: Al2 O3 (Al 995, CE 988, WESGO, Lucalox, G.E); BeO (Thermalox Brush-Beryllia); Si O2 (Quartz, Vicor); Glass 1723 (Corning); Pyroceram (Corning) and also Ferrites. Primary Metals: Zr, Ti, V, Nb, Ta, Mo, W, Al and Alloys: Molybden-Tungsten (50%), Stainless Steel (304), Nichrome (18% and 35% Cr.) and Kanthal. Secondary Metals: Cu, Ag, and Au. Tensile Strength Results are tabulated for all tests.
AD-658 685 HC$3.00 MF$0.65

THE PRODUCTION AND EVALUATION OF THE PROPERTIES OF TITANIUM ALLOY CASTINGS,
Ministry of Aviation London (England) Technical Information and Library Services
A. Dunlop, and H. C. Child. Mar 67, 35p
MA-S/T-Memo-2/67

Descriptors: (*Titanium alloys, *Castings), Titanium, Great Britain, Melting, Production, Casting, Tensile properties, Impellers, Centrifugal casting, Copper alloys, Aluminum alloys, Tin alloys, Surface properties.

A consumable electrode vacuum arc melting procedure using a 'skull' melting and pouring device produced satisfactory titanium castings. Centrifugal casting gave improved definition and surface finish to the castings. A ceramic shell moulding technique based on the lost wax process produced castings with good surface finish and accuracy, and with little surface contamination. Satisfactory castings were produced in a range of titanium alloys with tensile strengths in the range 28-55 tons/sq in. A pouring technique using consumable electrode vacuum arc furnace and copper and graphite crucibles sealed with a titanium plug which eventually melted to effect pouring was not satisfactory. (Author)
AD-658 750 HC$3.00 MF$0.65

MEASUREMENT OF OUTGASSING IN A SPUTTERING BELL JAR,
Army Electronics Command Fort Monmouth N J Integrated Electronics Div
William Weintraub. 30 Aug 66, 2p
Availability: Published in Review of Scientific Instruments v38 n3 p442-3 Mar 1967.

Descriptors: (*Vacuum apparatus, Sputtering), Measurement, Degasification, Sorption, Contamination, Argon, Quality control.

Occasionally, during cathode sputtering of metals, films are obtained which are not of the quality that one expects from the apparent operating conditions. Films which should have been metallic in nature can be oxide-like, as though the argon being bled into the system contained an inordinate amount of oxygen, or as though the system had developed a leak. Usually, on checking back, neither condition was found to have existed. The poor quality of the films can be due, however, to outgassing from the internal surfaces within the bell jar, and findings are related to this type of effect.
AD-658 944 Not available from CFSTI.

CLOSED TUBE APPARATUS FOR THE DEPOSITION OF SILICON OXIDE.
Revised ed.,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
G. W. Heunisch. 13 Mar 67, 1p
Revision of manuscript submitted 30 Dec 66.
Availability: Published in Journal of the Electrochemical Sociryu v114 n6 Jun 1967.

Descriptors: (*Electrodeposition, Films), (*Silicon compounds, Electrodeposition), Thermal properties, Decomposition, Oxides, Thickness, Platinum, Temperature, Oxygen compounds, Silanes.

A simple, closed tube method for the deposition of thin, silicon oxide films is presented. The apparatus is primarily designed to deposit silicon oxide by thermal decomposition of tetraethoxysilane. Tetraethoxysilane has received special interest because of its high oxygen content, making possible clear, thick films (1-3) and the low temperature needed for decomposition (4). Carrier gases have been eliminated, bulky furnace apparatus has been reduced, and the unit is safe and inexpensive. Uses of the method are restricted to those not involving highly accurate film thickness requirements. Film thickness control is within plus or minus 200A. (Author)
AD-658 951 Not available from CFSTI.

INFLUENCE OF TEMPERING, PRESTRAINING, AND RETEMPERING ON THE STRENGTH AND TOUGHNESS OF HIGH-STRENGTH 4340 STEEL.
Army Materials and Mechanics Research Center Watertown Mass
For primary bibliographic entry see Field 11F.
AD-659 003 HC$3.00 MF$0.65

INCREASING ELECTROCHEMICAL MACHINING RATES.
Final rept.,
Massachusetts Inst of Tech Cambridge
N. H. Cook, S. P. Loutrel, and M. C. Meslink. 16 Jan 67, 124p
AMRA-CR-67-03 (F)
Contract DA-19-066-AMC-268 (W)

Descriptors: (*Electroerosive machining, Velocity), Electrolytes, Pressure, Salts, Direct current, Pulse systems, Tungsten compounds, Carbides, Steel, Nickel alloys, Cobalt alloys.
Identifiers: Tungsten carbides.

Phenomena which may limit the rate of Electro-Chemical-Machining (ECM) are postulated, and indirectly studied by attempting their elimination. Of the mechanisms studied, three appear most promising: (1) Elevated electrolyte pressure in the ECM zone reduces boiling, cavitation, and formation of hydrogen bubbles. As a result, drilling rates of 1.5 in/min have been attained at current densities up to 19,700 amps/sq in. This can be compared with a typical 'maximum' rate of 1/4 in/min. (2) The use of fused salt electrolytes (such as NaOH) appears quite promising for difficult-to-ECM materials such as tungsten-carbide. (3) Pulsed Dc current with short reverse spikes appears promising for materials such as tungsten-car-

bide which normally form relatively impervious reaction layers. (Author)
AD-659 004 HC$3.00 MF$0.65

ADVANCEMENT OF ULTRASONIC TECHNIQUES USING RERADIATED SOUND ENERGIES FOR NONDESTRUCTIVE EVALUATION OF WELDMENTS.
Final technical rept.,
Automation Industries Inc Boulder Colo Research Div
B. T. Cross, and W. M. Tooley. 30 Aug 67, 62p
Rept no. TR-67-53
Contract NObs-92530

Descriptors: (*Welds, *Non-destructive testing), (*Ultrasonic radiation, Non-destructive testing), Quality control, Reliability.

No single testing method presently exists that will provide a complete nondestructive evaluation of structural welds. An ultrasonic inspection technique called the Delta Technique has been developed. This technique has many advantages over present weld inspection techniques. The Delta Technique is not sensitive to any preferential defect orientation and it can provide a permanent record of the test results. Delta inspections have been conducted successfully for both thick and thin butt welds and various configurations of tee welds. An inspection speed of 50 feet per hour was obtained in the laboratory. This was the maximum operating speed of the laboratory mechanical fixturing system and not the maximum operating speed of the Delta Technique. As a result of this program, we have defined the operating parameters necessary for inspecting butt welds with the Delta Technique. It is possible to assign operating parameters for a butt weld of given thickness in a specific material. Manual and automatic Delta weld inspection techniques have been studied. Each are applicable to inspection of the hull welds used in submarine fabrication. The Delta Technique can provide the Navy with a means for rapid, economical evaluation of butt welds and, potentially, other weld configurations, such as the tee weld. (Author)
AD-659 033 HC$3.00 MF$0.65

REALISTIC UNCERTAINTIES AND THE MASS MEASUREMENT PROCESS: AN ILLUSTRATED REVIEW,
National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
For primary bibliographic entry see Field 14B.
NBS-MONO-103 HC$0.20 MF$0.65

DEVELOPMENT OF GLASS PASSIVATION METHOD FOR SEMICONDUCTOR DEVICES FOR SATURN SYSTEM QUARTERLY PROGRESS REPORT, 28 JUN. - 28 SEP. 1966.
Philco Corp., Blue Bell, Pa. Microelectronics Div.
28 Sep 66, 69p NASA-CR-88194, QPR-1
Contract NAS8-18048

Descriptors: *Glass coating, *Saturn launch vehicle, *Semiconductor device, Bibliography, Coating, Density, Deposition, Device, Etching, Glass, Launch vehicle, Pinhole, Plating, Property, Semiconductor, Surface, Technique, Temperature, Vapor.

For abstract, see STAR 05 21.
N67-35628 HC$3.00 MF$0.65

THE APPLICATION OF LIQUID CRYSTALS FOR THERMOGRAPHIC TESTING OF BONDED STRUCTURES.
Lockheed-georgia Co., Marietta. Proficiency Development Lab.
S. E. Cohen. 1966, 55p NASA-CR-88196, PDL-7
Contract NAS8-20627

Descriptors: *Birefringent coating, *Bonding, *Color photography, *Composite material, *Differential thermal analysis (dta), *Nondestructive testing, Analysis, Birefringence, Coating, Color, Composite, Crystal, Differential, Flaw, Honeycomb, Laminate, Liquid, Material, Nondestructive, Panel, Photographic, Photography, Recording, Structure, Testing, Thermal, Thermograph.

For abstract, see STAR 05 21.
N67-35747 HC$3.00 MF$0.65

JOINING REFRACTORY/AUSTENITIC BIMETAL TUBING FINAL TECHNICAL REPORT, APR. 1965 - OCT. 1966.
Westinghouse Electric Corp., Pittsburgh, Pa. Astronuclear Lab.
D. R. Stoner. Oct 66, 116p NASA-CR-72275, WANL-PR-/ZZ/-001
Contract NAS3-7621

Descriptors: *Arc welding, *Electron beam welding, *Stainless steel, *Tubing, *Tungsten, *Welded joint, Arc, Austenite, Beam, Bimetallic, Electron, Gas, Joint, Metal, Niobium, Plasma, Refractory, Stainless, Steel, Welding.

For abstract, see STAR 05 21.
N67-36029 HC$3.00 MF$0.65

CASTING SCIENCE.
Waterloo Univ. (Ontario). Mechanical Engineering Dept.
M. J. Hillier. 1967, 250p

Descriptors: *Casting, *Manual, *Manufacturing, *Metal, Die, Flow, Fluid, Heat transfer, Mold, Process, Sand, Solidification, Textbook, Time.

For abstract, see STAR 05 21.
N67-36119 HC$3.00 MF$0.65

STANDARD FOR COLOR CODE FOR SHOP MACHINERY AND EQUIPMENT.
National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
21 Feb 67, 18p NASA-TM-X-60222, KSC-STD-S0003

Descriptors: *Equipment specifications, *Machine tool, *Paint, Chrome, Code, Color, Compound, Enamel, Equipment, Finish, Machine, Shop, Specification, Standard, Tool, Zinc.

For abstract, see STAR 05 21.
N67-36668 HC$3.00 MF$0.65

DEVELOPMENT OF COMPUTER AIDS FOR TAPE-CONTROL OF PHOTOCOMPOSING MACHINES. REPORT NO. 2. EXTENSION OF THE SYSTEM OF PREPARING A COMPUTER-PROCESSED TAPE TO INCLUDE THE SETTING OF MULTIPLE LINE EQUATIONS.
American Mathematical Society, Providence, R. I.
For primary bibliographic entry see Field 14E.
PB-175 939 HC$3.00 MF$0.65

SOME AOQ AND AFI VALUES FOR THE DODGE AND TORREY CSP-3 CONTINUOUS SAMPLING PLAN,
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
R. H. Hull, Jr. 7 Jul 67, 176p
Contract W-7405-eng-26

Descriptors: (*Sampling, Computer programs), (*Quality control, *Programming languages), Decision making, Probability, Tables, Costs.

For abstract, see NSA 21 19.
Y-1585 HC$3.00 MF$0.65

13I. Machinery and Tools

A STUDY OF THE CAUSES OF WIRE ROPE AND CABLE FAILURE IN OCEANOGRAPHIC SERVICE,
All American Engineering Co Wilmington Del
Robert B. Powell. Sep 67, 43p Rept no. N-576
Contract N62306-67-C-0287

Descriptors: (*Wire, Failure (Mechanics)), (*Cables (Mechanical), Failure (Mechanics)), Oceanographic equipment, Stresses, Corrosion, Operation, Towing cables, Mooring, Performance (Engineering), Hoists, Reliability, Marine engineering.

A study has been made, through a literature search and a survey of users and manufacturers, of the causes of failure of wire rope in marine and oceanographic applications. Although the material, construction, and application of wire rope were symptomatic of the majority of causes of failure, incorrect operating procedures and improper choice of related equipment were large factors. Recommendations are made for further investigation and development to improve performance and reliability. (Author)
AD-658 871 HC$3.00 MF$0.65

MECHANICS OF RAISING AND LOWERING HEAVY LOADS IN THE OCEAN: EXPERIMENTAL RESULTS.
Naval Civil Engineering Lab Port Hueneme Calif
For primary bibliographic entry see Field 13J.
AD-659 025 HC$3.00 MF$0.65

PRELIMINARY DETERMINATIONS OF TEMPERATURE LIMITATIONS OF ESTER, ETHER, AND HYDROCARBON BASE LUBRICANTS IN 25-MM BORE BALL BEARINGS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 11H.
For abstract, see STAR 05 21.
N67-35751 HC$3.00 MF$0.65

STANDARD FOR COLOR CODE FOR SHOP MACHINERY AND EQUIPMENT.
National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 05 21.
N67-36668 HC$3.00 MF$0.65

A STUDY OF SOME FACTORS AFFECTING ROLLING-CONTACT FATIGUE LIFE.
Technical rept.,
National Aeronautics and Space Administration. Cleveland, Ohio. Lewis Research Center.
Thomas L. Carter. 1960, 53p NASA-TR-R-60
AD-245 170, N62-70484

Descriptors: (*Antifriction bearings, Fatigue (Mechanics)), Stresses, Lubricants, Viscosity, Metallography, Life expectancy.

The rolling-contact fatigue spin rig was used to evaluate the effect on rolling-contact fatigue life of the following factors: stress, forging fiber orientation, lubricant viscosity, lubricant base stock, temperature, dry-powder lubricants, metallurgical structure, and alloy composition. Ball specimens of 1/2- or 9/16-inch diameter were tested at loads producing maximum theoretical Hertz compressive stresses of 600,000 to 750,000 psi. Results showed that each factor studied had a definite effect on rolling-contact fatigue life. (Author)
PB-175 863 HC$3.00 MF$0.65

MACHINE SHOP, MACHINE REPAIRS HANDBOOK. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.

Naval Facilities Engineering Command, Washington, D. C.
Nov 66, 202p NAVFAC-P-707.0
Supersedes PB-181 125-2.

Descriptors: (*Machine shop practice, Handbooks), (*Machine tools, Maintenance), (*Maintenance, *Time studies), Performance (Human), Standards, Tables.

The document is comprised of task-time spread sheets concerning machine shop and machine repair tasks, and is intended for use by qualified planner-estimators. Instructions for use are given in PB-160 647.
PB-175 995 HC$3.00 MF$0.65

THE MARKET FOR PLASTICS PRODUCTION EQUIPMENT, RAW MATERIALS AND SEMI-FINISHED PRODUCTS IN ITALY.
Oliver-Beckman Italiana S.r.l., Rome (Italy).
For primary bibliographic entry see Field 11I.
PB-176 095 HC$3.00 MF$0.65

13J. Marine Engineering

DEVELOPMENT OF FLUIDIC LOGIC START-UP SYSTEM FOR MAIN FORCED DRAFT BLOWERS.
Naval Ship Engineering Center Philadelphia Pa Philadelphia Div
For primary bibliographic entry see Field 13G.
AD-658 499 HC$3.00 MF$0.65

ROUGH WATER MATING OF ROLL-ON/ROLL-OFF SHIPS WITH BEACH DISCHARGE LIGHTERS.
Technical rept.,
Hydronautics Inc Laurel Md
T. Hsieh, C. C. Hsu, D. P. Roseman, and W. C. Webster. Jul 67, 136p Rept no. TR-636-1
Contract N00014-66-C-0116

Descriptors: (*Landing craft, Attachment), (*Cargo ships, Motion), Cargo, Handling, Roll, Ocean waves, Equations of motion.

The purpose of the study is to determine the optimum position for the mating of the beach discharge lighter USAV LT COL JOHN V.D. PAGE and the roll-on/roll-off ship USNS COMET. Theoretical and experimental investigations of the individual ship motions (i.e., surge, heave, sway, pitch, roll and yaw) and the relative motions between the stern of ships (i.e., relative surge, heave, sway and roll) for the above mentioned two ships were carried out at zero ship speed and various sea conditions. Results for the motions were presented as a function of wavelengths, wave directions and sea states. It was found that either head seas or following seas was the best position for the mating. Further, the shallow water effect on the ship motions were investigated and results were also presented. (Author)
AD-658 535 HC$3.00 MF$0.65

THE EXPERIMENTAL DETERMINATION OF THE RUDDER FORCES AND RUDDER TORQUE OF A MARINER CLASS SHIP MODEL,
California Univ Berkeley Coll of Engineering
Hsao-Hsin Chen. Jul 67, 44p Rept no. NA-67-5
Contract Nonr-3656 (10)

Descriptors: (*Marine rudders, *Dynamometers), Force (Mechanics), Torque, Cargo ships, Ship models, Steering.

The design of a three component rudder dynamometer intended for use with surface ship models approximately five feet long is described. This dynamometer is intended to measure the longitudinal force, transverse force, and moment about the centerline of the rudder stock. The design working ranges for these three quantities are plus or minus 0.675 pounds for the forces and plus or minus 0.1125 inch pounds for the moment. Satisfactory operation of the completed dynamometer is demonstrated by results obtained in a series of tests using a 1/96 scale model of a Mariner class cargo ship. Both self-propelled and unpropelled tests were run. Results obtained in these tests are compared with rudder performance calculated from airfoil data and results obtained by other experimenters. (Author)
AD-658 539 HC$3.00 MF$0.65

FORCE REQUIRED TO EXTRACT OBJECTS FROM DEEP OCEAN BOTTOM.
Research rept.,
Southwest Research Inst San Antonio Tex
R. C. DeHart, and C. R. Ursell. 19 Sep 67, 13p
Contract Nonr-3363 (00)

Descriptors: (*Marine engineering, Salvage), (*Salvage, *Underwater vehicles), Ocean bottom, Pressure, Soils, Deep submergence, Weight, Tables, Underwater objects.

A preliminary investigation of the force required to extract an object from the bottom of the ocean was conducted. Ocean depths equivalent to pressures of 3000 psi were simulated and the effect of soil type, object size and object configuration was studied. (Author)
AD-658 757 HC$3.00 MF$0.65

AMMI PONTOON FIELD ASSEMBLY PROCEDURES.
Technical rept.,
Naval Civil Engineering Lab Port Hueneme Calif
P. J. Rush. Sep 67, 46p Rept no. NCEL-TR-544

Descriptors: (*Floats, Instruction manuals), Naval equipment, Naval personnel, Site selection, Welding, Quality control, Environment, Launching, Marine engineering, Panels (Structural).

The report was prepared for use as a manual by the military crews engaged in the assembly of Ammi Pontoons under conditions where all of the conveniences of production shops or yards are not available. The manual covers phases of field assembly including crew and equipment requirements, site selection and preparation, layout, fitting-up, welding, inspection, and launching. Since the principal factor in quality control is the welding operations, these are discussed in considerable detail.
AD-658 883 HC$3.00 MF$0.65

MECHANICS OF RAISING AND LOWERING HEAVY LOADS IN THE OCEAN: EXPERIMENTAL RESULTS.
Technical rept.,
Naval Civil Engineering Lab Port Hueneme Calif
B. J. Muga. Sep 67, 66p Rept no. NCEL-TR-543

Descriptors: (*Loading (Mechanics), Underwater objects), (*Cordage, Loading (Mechanics)), (*Cables (Mechanical), Loading (Mechanics)), Experimental data, Nylon, Steel, Wire, Stresses, Deep water, Motion, Dynamics, Damping, Drag, Marine engineering.

To establish the degree of agreement between theoretical and experimental results, tests were conducted on high-mass, low-drag bodies (a reinforced concrete sphere, a cylinder, and a parallelepiped) suspended from various lengths of nylon line and steel wire cable. Random excitations were induced in the loaded cables by the roll, heave, and pitch of the drifting test ship from which the loaded cable was suspended. Except for apparent frequency shifts in the response amplitude operators for loaded nylon lines at the greater depths, there was good agreement between the theoretical and the experimental results. (Author)
AD-659 025 HC$3.00 MF$0.65

SMOOTH WATER RESISTANCE OF A NUMBER OF PLANING BOAT DESIGNS.
Research and development rept.,
David Taylor Model Basin Washington D C Hydromechanics Lab
Eugene P. Clement, and Charles W. Tate, Sr. Oct 59, 37p
DTMB-1378

Descriptors: (*Crash rescue boats, Design), Boats, Planing surfaces, Sea rescues, Loading (Mechanics), Drag, Ship hulls, Model tests.

Models of a number of different planing boat designs were towed in smooth water to provide data for guidance in designing aircraft rescue boats and similar high-speed craft. Resistance, trim, rise, and wetted surface were determined for each design for either standard or comparable conditions of hull loading and center of gravity location. The test data, lines, and hull form characteristics for each design are presented in a design data sheet. The resistances of the different designs are compared, and reasons given for significant differences. (Author)
AD-659 030 HC$3.00 MF$0.65

CHOKING OF STRUT-VENTILATED FOIL CAVITIES.
Hydronautics Inc Laurel Md
For primary bibliographic entry see Field 20D.
AD-659 046 HC$3.00 MF$0.65

THE DTMB PLANAR-MOTION-MECHANISM SYSTEM.
Naval Ship Research and Development Center Washington D C Hydromechanics Lab
For primary bibliographic entry see Field 20D.
AD-659 053 HC$3.00 MF$0.65

VIBRATION MEASUREMENTS OF THE HULL, TRIPOD MAST, PROPULSION SYSTEM, AND RUDDER SYSTEM OF USS AUSTIN (LPD-4).
Research and development rept.,
Naval Ship Research and Development Center Washington D C Acoustics and Vibration Lab
Nicholas Huzil, Gary P. Antonides, and Arthur F. Kilcullen. Jun 67, 45p
NSRDC-2331

Descriptors: (*Landing craft, Vibration), (*Ship structural components, Vibration), (*Marine propulsion, Vibration), Marine engines, Ship hulls, Naval vessels (Combatant), Measurement, Marine rudders, Maneuverability.
Identifiers: LPD 4.

Natural hull frequencies in vertical and athwartship direction and in rotation were identified. Vibration amplitudes did not exceed 2.5 mils during steady-speed runs and were below 12 mils during maneuvers. Vibration levels for all test conditions are not considered excessive. Natural frequencies of the tripod mast were measured, and amplitudes at the highest radar platform were found to be below 36 mils during steady-speed runs and below 44 mils during maneuvers. Critical speeds of the propulsion system for longitudinal vibration occurred at 132 and 174 rpm for the starboard and port shafts, respectively. When the ship was on a steady course, the levels of longitudinal vibration, alternating thrust, and alternating torque in the propulsion system were low even at critical speeds. The alternating thrust increased considerably when the ship was in a hard left turn at or near 174 rpm or in a hard right turn at or near 132 rpm. Variable torque in the propulsion system was satisfactorily low--less than 2 percent of the mean torque. A torsional shaft critical at 2.3 Hz was excited by blade frequency only at very low power.

Motor current surges in the steering gear system exceeded the design limit at high speeds. Surges at the port motor were higher than at the starboard motor. Pressures in the hydraulic ram cylinders were below design pressure. (Author)
AD-659 054 HC$3.00 MF$0.65

SODIUM AMALGAM-OXYGEN FUEL CELL POWER PLANT FOR SUBMARINE APPLICATION: A DESIGN FEASIBILITY STUDY.
Kellogg (M W) Co Piscataway N J Research and Development Center
For primary bibliographic entry see Field 10B.
AD-659 055 HC$3.00 MF$0.65

A PILOT PLANT STUDY OF LOW EXCESS AIR COMBUSTION - ITS EFFECT ON FIRESIDE PROBLEMS IN OIL-FIRED BOILERS.
Final rept.,
Babcock and Wilcox Co., Alliance, Ohio. Research and Development Div.
P. Sedor. 15 May 67, 175p BW-7787
Contract MA-3444

Descriptors: (*Marine surface propulsion, Boilers), (*Oil burners, Marine propulsion), (*Boilers, Heating), Combustion, Fuels, Pilot plants, Combustion products, Deposits, Impurities, Corrosion, Fouling.

Fireside problems in oil-fired marine boilers, including high-temperature ash deposition and high- and low-temperature corrosion, decrease efficiency and availability of the unit and often result in increased maintenance and repair costs. These problems are associated with impurities in the heavy residual fuel oil. These impurities include vanadium, sodium, and sulfur. The first section presents an extensive review and technical evaluation of available information on fuel oil combustion and related fields to determine what benefits can be expected by operating oil-fired boilers with controlled, low excess air combustion, and how such a combustion process can best be designed and controlled. The second section presents the results obtained from eight tests that were run on a pilot plant firing a troublesome residual fuel oil to determine the effect of low excess air combustion on the fireside problems. The results show that significant reductions in both high- and low-temperature corrosion were obtained when the heavy oil was burned at a level of 1 to 2% excess air. In addition, the high-temperature ash deposition rate was decreased and the deposits that formed were softer and more easily removed than those formed when firing at normal (7 to 8%) excess air. (Author)
PB-175 805 HC$3.00 MF$0.65

A PROFILE OF HUMAN FACTOR REQUIREMENTS IN THE MARITIME INDUSTRY,
George Washington Univ., Washington, D. C.
For primary bibliographic entry see Field 5E.
PB-175 940 HC$3.00 MF$0.65

13K. Pumps, Filters, Pipes, Fittings, Tubing, and Valves

DEVICE FOR CHECKING THE CAPACITY OF AN OIL PUMP,
Department of the Army Washington D C
For primary bibliographic entry see Field 14B.
AD-658 531 HC$3.00 MF$0.65

PIPEFITTING, PLUMBING FORMULAS. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.
Naval Facilities Engineering Command, Washington, D. C.
Nov 66, 167p NAVFAC-P-711.1
Supersedes PB-181 451.

Descriptors: (*Sanitary engineering, Maintenance), (*Maintenance, *Time studies), Performance (Human), Standards, Tables.

The document is comprised of task-time formulas for various pipefitting and plumbing tasks for use by qualified planner-estimators.
PB-175 927 HC$3.00 MF$0.65

PIPEFITTING, PLUMBING HANDBOOK. ENGINEERED PERFORMANCE STANDARDS, PUBLIC WORKS MAINTENANCE.
Naval Facilities Engineering Command, Washington, D. C.
Nov 66, 163p NAVFAC P-711.0
Supersedes PB-181 460.

Descriptors: (*Sanitary engineering, Handbooks), (*Maintenance, *Time studies), Performance (Human), Standards, Tables.

The document is comprised of task-time spread sheets concerning pipefitting and plumbing tasks, and is intended for use by qualified planner-estimators. Instructions for use are given in PB-160 647.
PB-175 985 HC$3.00 MF$0.65

13L. Safety Engineering

COST-EFFECTIVENESS ANALYSIS FOR THE FIRE SERVICE: AN OVERVIEW.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 14A.
AD-658 471 HC$3.00 MF$0.65

THE WINGSPREAD CONFERENCE: A CHALLENGE TO ACTION.
Professional paper,
System Development Corp Santa Monica Calif
Hilton F. Jarrett. 2 Sep 67, 38p Rept no. SP-2937

Descriptors: (*Fire safety, Symposia), (*Systems engineering, Fire safety), Behavior, Attitudes, Motivation, Education, Training, Supervisory personnel, Effectiveness.
Identifiers: Insurance business.

The report contains a review of the Wingspread Conference on fire service administration, education and research, with author commentary and recommendations.
AD-658 475 HC$3.00 MF$0.65

CONTROL OF GUN FUMES IN M-4 SERIES MEDIUM TANKS.
Army Medical Research Lab Fort Knox Ky
15 Feb 43, 25p
Rept. on proj. 'Determination of the Characteristics and Effects Upon the Crew of Gun Fumes from Firing of the Weapons in Tanks of the M4 Medium Series and Development of Effective Control'.

Descriptors: (*Tanks (Combat vehicles), *Exhaust gases), Carbon monoxide, Hazards, Machine guns, Ammonia, Toxic tolerances, Ventilation, Exhaust systems, Irritating agents, Eye, Blood analysis.

The purpose of the report is to determine the magnitude of the hazard resulting from the gun fumes in the M-4 series of medium tanks and the development of effective means for the control of the hazard. (Author)
AD-658 551 HC$3.00 MF$0.65

DETERMINATION OF BASIC VENTILATION CHARACTERISTICS OF TANKS OF THE M4 SERIES. DETERMINATION OF BASIC VENTILATION CHARACTERISTICS OF TANKS OF THE M5 SERIES.
Rept. no. 1,
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch, and Robert H. Walpole. 26 Apr 43, 21p
Rept. on proj. 'Toxic Gases in Armored Vehicles'.

Descriptors: (*Tanks (Combat vehicles), *Exhaust gases), (*Ventilation, Tanks (Combat vehicles)), Heat, Safety, Efficiency, Air pollution, Protection, Chemical warfare agents, Pressure, Dust, Toxic tolerances.

The purpose of the report is to determine the basic characteristics and limitations of the system of crew compartment ventilation employed at the present time in the M4 and M5 tanks as related to the protection provided to the crew members. The purpose of ventilation of the fighting compartment in a tank is to insure, as far as possible, a reasonably safe atmospheric environment and one in which the efficiency of the crew will not be seriously impaired. The most important functions of crew compartment ventilation are: control of gun fumes; removal of excess heat; effective heating of crew in cold weather; control of dust; protection against chemical warfare agents. Crew compartment ventilation in the M4 and M5 tanks is provided as a by-product of the engine ventilation and is not subject to independent control. This system of negative-pressure ventilation is wholly incapable of meeting certain of the desired functions of crew compartment ventilation and meets the others only in part. A complete discussion of the characteristics and limitations of ventilation in the M4 and M5 tanks is presented. (Author)
AD-658 552 HC$3.00 MF$0.65

VENTILATION REQUIREMENTS FOR GAS-PROOFING THE M-5 TANK,
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch, and R. H. Walpole, Jr. 24 Dec 42, 10p

Descriptors: (*Tanks (Combat vehicles), *Ventilation), Pressure, Safety, Protection, Leakage (Fluid), Contamination, Machine guns.

The purpose of the report is to determine the capacity of a pressure ventilating system and gas canister required to maintain adequate positive-pressure within the M-5 tank. (Author)
AD-658 553 HC$3.00 MF$0.65

CONTROL OF GUN FUMES IN M4 SERIES MEDIUM TANKS BY POSITIVE-PRESSURE VENTILATION.
Army Medical Research Lab Fort Knox Ky
22 Jul 43, 6p
Rept. on proj. 'Toxic Gases in Armored Vehicles .

Descriptors: (*Tanks (Combat vehicles), *Ventilation), Carbon monoxide, Air pollution, Gun smoke, Pressure, Machine guns, Design.

The purpose of the report is to determine the degree of improvement in control of the gun fume hazard in the M4 series of medium tanks resulting from conversion of the crew compartment ventilation from the negative-pressure type to positive-pressure. An opportunity was presented in connection with the experimental development of a gas-proof tank to determine the benefits of positive-pressure ventilation from the standpoint of control of gun fumes. (Author)
AD-658 555 HC$3.00 MF$0.65

CARBON MONOXIDE HAZARD FROM EXHAUST GASES IN TANKS THAT ARE IN TOW.
Army Medical Research Lab Fort Knox Ky
11 May 44, 15p

Descriptors: (*Exhaust gases, *Hazards), Carbon monoxide, Tanks (Combat vehicles), Safety, Towed vehicles, Poisoning, Towing cables, Wind, Velocity.

The purpose of the report is to investigate the magnitude of the carbon monoxide hazard in a towed tank resulting from pollution by the engine exhaust of the towing vehicle. The report covers the investigation of the carbon monoxide hazard in tanks being towed by each of four towing vehicles: M4A1 and M4A3 medium tanks, and M32B1 and M32B3, recovery vehicles, over two courses representing level road and upgrade driving, the tanks each being tested alternately with towing bar and towing cable. (Author)
AD-658 568 HC$3.00 MF$0.65

DISCUSSION OF VENTILATION REQUIREMENTS OF ARMORED VEHICLES,
Army Medical Research Lab Fort Knox Ky
Theodore F. Hatch. 22 Oct 45, 7p

Descriptors: (*Tanks (Combat vehicles), *Ventilation), Pressure, Safety, Protection, Design, Efficiency, Heat, Machine guns, Humidity.

The purpose of the report is to outline the requirements for crew compartment ventilation in tanks and indicate certain desired future lines of investigation and development. (Author)
AD-658 569 HC$3.00 MF$0.65

TEST OF CARBON MONOXIDE HAZARD FROM ENGINE IN LIGHT TANK, M24,
Army Medical Research Lab Fort Knox Ky
Robert H. Walpole. 19 Apr 45, 6p

Descriptors: (*Exhaust gases, *Hazards), (*Tanks (Combat vehicles), Tank engines), Carbon monoxide, Safety, Poisoning, Design, Exhaust pipes, Ventilation, Wind.

The purpose of the report is to investigate the carbon monoxide hazard in the fighting compartment of subject vehicle from contamination by exhaust fumes. Hazardous carbon monoxide concentrations are found within the fighting compartment from exhaust gases entering the engine air intake when the vehicle is stationary with engine idling and wind is from the rear. Danger of crew compartment contamination from this source is largely eliminated through changes in direction of discharge of engine exhaust gases to prevent short-circuiting to the air intake. Recommendations are to redesign exhaust tail pipe to eliminate contamination of air entering fighting compartment by engine exhaust fumes. (Author)
AD-658 570 HC$3.00 MF$0.65

VENTILATION REQUIREMENTS FOR GAS-PROOFING TANKS OF THE M-4 SERIES,
Army Medical Research Lab Fort Knox Ky
T. F. Hatch, and R. H. Walpole. 1 Mar 43, 6p

Descriptors: (*Tanks (Combat vehicles), *Ventilation), Leakage (Fluid), Pressure, Machine guns, Protection, Contamination, Safety.

The purpose of the report is to determine the important leakage areas in the series M-4 tanks and the amount of sealing required to maintain adequate pressure for gas-proofing the tank with ventilation equipment of practical size and power consumption. (Author)
AD-658 571 HC$3.00 MF$0.65

PROTECTION OF PERSONNEL IN TANKS AGAINST TOXIC AGENTS.
Rept. no. 1,
Army Medical Research Lab Fort Knox Ky
Robert H. Walpole. 7 Mar 44, 11p

Descriptors: (*Tanks (Combat vehicles), Chemical warfare agents), (*Ventilation, Tanks (Combat vehicles)), Heat, Safety, Protection, Contamination, Dust, Toxic tolerances, Pressure, Liquids.

The purpose of the report is to study the practical usefulness for tank crews of an individual-collective protection system against chemical warfare agents. The Canadian Army Chemical Warfare Laboratories have developed a gas-protection system for the Ram Tank series, consisting of a positive supply of purified air through face masks to each crew member and sealing materials for closing hull openings to eliminate entry of liquid agents. The basic plan behind the development of this method of CW protection is based upon two broad principles: to reduce the probability of direct contamination of tank crews by liquid CW agents, to provide a positive supply of decontaminated air for breathing through a facepiece which would be sufficiently comfortable to be worn continuously. Ideally, the facepiece should be preferred for use at all times regardless of the gas hazard, thus eliminating the possibility of casualties from a surprise gas attack. This method of protection is not to be considered as a substitute for positive-pressure ventilation of the crew compartment. It is a major interest as a means of providing protection in tanks now in the field, whereas the positive-pressure lends itself particularly to incorporation into new models of tanks. (Author)
AD-658 573 HC$3.00 MF$0.65

TOXIC GASES IN ARMORED VEHICLES. DETERMINATION OF VENTILATION REQUIREMENTS FOR GAS-PROOFING TANKS OF THE M4 SERIES.
Army Medical Research Lab Fort Knox Ky
23 Jun 43, 16p

Descriptors: (*Tanks (Combat vehicles), *Ventilation), Design, Protection, Chemical warfare agents, Leakage (Fluid), Protection, Machine guns, Pressure, Efficiency.

The purpose of the report is to determine the basic design requirements of a system of positive-pressure ventilation for the M4A3 tank and the feasibility of installing the necessary equipment in the tank. To investigate the degree of protection against chemical warfare agents obtained by this method of ventilation. (Author)
AD-658 576 HC$3.00 MF$0.65

CARBON MONOXIDE HAZARD FROM AUXILIARY GENERATORS IN TANKS,
Army Medical Research Lab Fort Knox Ky
Norton A. Nelson, and Theodore F. Hatch. 20 Dec 42, 7p

Descriptors: (*Tanks (Combat vehicles), Hazards), (*Generators, *Carbon monoxide), Safety, Effectiveness, Leakage (Fluid), Exhaust pipes, Wind, Velocity.

The purpose of the report is to determine the magnitude of the carbon monoxide hazard resulting from the operation of auxiliary generators in tanks when the tank motor is not running and to test the effectiveness of corrective measures. (Author)
AD-658 600 HC$3.00 MF$0.65

TEST OF NON-SKID PAINT ON TANKS,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 11C.
AD-658 626 HC$3.00 MF$0.65

REPORT ON GUN FUME HAZARD FROM 37Mm GUN IN M5 LIGHT TANK,
Army Medical Research Lab Fort Knox Ky
Willard Machle. 18 Feb 43, 7p
Rept. on proj. 'Determination of the Characteristics and Effects upon the crew of Gun Fumes from Firing of the Weapons in Tanks of the M-5'.

Descriptors: (*Tanks (Combat vehicles), *Exhaust gases), Carbon monoxide, Hazards, Machine guns, Ammonia, Eye, Irritating agents, Toxic tolerances, Ventilation, Exhaust systems, Blood analysis.

The purpose of the report is to determine the extent of the hazard from fumes released in firing the 37 Mm gun in the M-5 light tank. (Author)
AD-658 636 HC$3.00 MF$0.65

CARBON MONOXIDE HAZARD FROM AUXILIARY GENERATORS IN TANKS,
Army Medical Research Lab Fort Knox Ky
Norton Nelson, and T. C. Swigert. 2 Apr 43, 5p
Rept. on proj. 'Determination of the Carbon Monoxide Hazard from Auxiliary Generators in Tanks.'

Descriptors: (*Tanks (Combat vehicles), Hazards), (*Generators, *Carbon monoxide), Safety, Exhaust gases, Protection, Exhaust pipes, Toxic tolerances, Leakage (Fluid), Wind.

The purpose of the report is to determine the magnitude of the carbon monoxide hazard resulting from operation of auxiliary generators in tanks when the tank motor is not running. (Author)
AD-658 637 HC$3.00 MF$0.65

TOXIC GASES IN ARMORED VEHICLES. DETERMINATION OF THE CHARACTERISTICS AND EFFECTS UPON THE CREW OF GUN FUMES FROM FIRING OF THE WEAPONS IN TANKS OF THE M5 SERIES.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Norton Nelson, Steven M. Horvath, Ludwig W. Eichna, and Robert Walpole, Jr. 26 Apr 43, 6p

Descriptors: (*Tanks (Combat vehicles), Ventilation), (*Toxic tolerances, Personnel), Carbon monoxide, Air pollution, Machine guns, Ammonia, Blood analysis.

The purpose of the report is to determine the extent of the hazard from fumes released by firing of the weapons in the M5A1 tank. (Author)
AD-658 638 HC$3.00 MF$0.65

ISOTHERMAL DEGRADATION OF UNTREATED AND FIRE RETARDANT TREATED CELLULOSE AT 350C,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 7D.
AD-658 717 HC$3.00 MF$0.65

DESIGN OF TESTS FOR THE EFFECTS OF MASS FIRES ON SHELTER OCCUPANTS.
Isotopes Inc Palo Alto Calif
For primary bibliographic entry see Field 13M.
AD-658 734 HC$3.00 MF$0.65

EFFECT OF POINT ARGUELLO WIND VARIABILITY UPON RANGE SAFETY CONSIDERATIONS AT WTR.
Aerospace Corp El Segundo Calif El Segundo Technical Operations
For primary bibliographic entry see Field 16A.
AD-658 847 HC$3.00 MF$0.65

COMBUSTIBILITY TESTS ON SEVERAL FLAME-RESISTANT FABRICS IN COMPRESSED AIR, OXYGEN-ENRICHED AIR, AND PURE OXYGEN,
Union Carbide Corp Tonawanda N Y Linde Div
For primary bibliographic entry see Field 11E.
AD-658 953 Not available from CFSTI.

DETERMINATION OF PHYSICAL CRITERIA FOR ROADSIDE ENERGY CONVERSION SYSTEMS.
Final technical rept.,
Cornell Aeronautical Lab., Buffalo, N. Y.

Raymond R. McHenry, David J. Segal, and Norman J. DeLeys. Jul 67, 249p CAL-VJ-2251-V-1
Contract CPR-11-3988

Descriptors: (*Roads, *Safety), (*Motor vehicle accidents, *Energy conversion), Mathematical models, Terrain, Models (Simulations), Rural areas, Motion, Captive tests, Deformation, Impact tests, Velocity, Loading (Mechanics), Deflection, Acceleration, Response, Tables.

The objective of the described research has been to develop analytical means for evaluating existing and proposed roadside energy conversion systems. An eleven degree of freedom nonlinear mathematical model of an automobile traversing a variety of irregular terrain features and encountering a variety of roadside obstacles has been formulated and programmed for a digital computer. A unique feature of the simulation is that of combined cornering and ride motions. In its present form, the computer program includes open loop evasive maneuvers. The mathematical model is described, and a series of comparisons is presented between simulated responses and test results from the literature. The comparisons include cornering, ride, ditch traversal, curb impact, and guardrail impact responses. The results of a review of single vehicle accident statistics and a summary of vehicles and roadside parameter data, collected within this project, are each presented. The vehicle parameter data include the results of static and dynamic measurements of structural load-deformation properties performed within this research program. (Author)
PB-175 919 HC$3.00 MF$0.65

13M. Structural Engineering

THE BIHARMONIC BOUNDARY VALUE PROBLEM AS APPLIED TO A MEMBRANE HAVING IRREGULAR SHAPE.
Final rept.,
Oklahoma State Univ Stillwater School of Mechanical Engineering
R. E. Chapel, and H. W. Smith. 18 Aug 67, 74p
Rept no. OSU-AS-67-F-5
AFOSR-67-1768
Grant AF-AFOSR-1153-66
Prepared in cooperation with Boeing Co., Wichita, Kansas.

Descriptors: (*Membranes, Boundary value problems), Stresses, Aluminum alloys, Structural shells, Matrix algebra, Functions, Operators (Mathematics).

A two-dimensional linear elastostatic boundary value problem is formulated for a web having irregular shape. The stresses in the interior of the region are found by obtaining the Airy function then taking second partial derivatives. Finite-difference numerical techniques used by British authors are used except that the simultaneous equations are solved directly instead of using relaxation methods. With the aid of the irregular biharmonic 'star' operator, the equations are written in matrix notation and solved with digital computing equipment. An aluminum alloy semi-monocoque shell structure, fitted with electric resistance strain gages, is loaded statically. Data taken from these experiments are compared to the theoretical values. Ancillary information involving ultrasonic, optical, photostress, and brittle lacquer experiments are briefly described. A coarse (1 in square) and a fine (1/2 in square) grid was formulated for two variations of slope equations. Theoretical-to-experimental stress comparison show nearly perfect agreement for centrally located nodes for all 4 variations of theory. Maximum dispersion occurs in sigma sub yy at the boundary adjacent to the vertical shear load transfer member. (Author)
AD-658 464 HC$3.00 MF$0.65

THE NWL PLASTIC BRIDGE PROGRAM.
Technical memo.,
Naval Weapons Lab Dahlgren Va
W. G. Soper. Aug 67, 22p Rept no. NWL-TM-T-10/67

Descriptors: (*Bridges, *Structural properties), Computer programs, Damage, Elasticity, Plasticity, Mathematical models.

A new elastic-plastic computer model for damaged bridges is applied to several realistic examples. Results are superior to earlier elastic analyses for structures where strains vary monotonically during collapse. For other cases, a modification of the present program is required to seek out those plastic structural members which return to the elastic regime. (Author)
AD-658 500 HC$3.00 MF$0.65

ACTIVE ARCHING OF SAND DURING DYNAMIC LOADING: RESULTS OF AN EXPERIMENTAL PROGRAM AND DEVELOPMENT OF AN ANALYTICAL PROCEDURE.
Naval Civil Engineering Lab Port Hueneme Calif
For primary bibliographic entry see Field 8M.
AD-658 502 HC$3.00 MF$0.65

SHAKEDOWN INTERACTION CURVE FOR A CIRCULAR ARCH,
Illinois Inst of Tech Chicago Dept of Mechanics
For primary bibliographic entry see Field 20K.
AD-658 504 HC$3.00 MF$0.65

ELEMENT STIFFNESS-MATRICES FOR BOUNDARY COMPATIBILITY AND FOR PRESCRIBED BOUNDARY STRESSES,
Massachusetts Inst of Tech Cambridge
Theodore H. H. Pian. 1965, 23p
AFOSR-67-1940, AFFDL-TR-66-80
Grant AF-AFOSR-347-64
Availability: Published in Proceedings Matrix Methods Struct. Mechs. p457-77 Wright-Patterson AFB, Ohio, 26-28 Oct, 1965.

Descriptors: (*Matrix algebra, Structural properties), Stresses, Compatibility, Boundary value problems, Rectangular bodies, Bending, Metal plates, Panels (Structural).

A method for the derivation of element stiffness matrices based on the principle of minimum complementary energy employing assumed stress distribution is described. Two different types of elements are considered: (1) one which is constrained at the entire boundary, and (2) one which has prescribed stresses along the boundary. The result shows that by using sufficiently large number of terms for the assumed stress distribution, a converging stiffness matrix can be obtained. Example calculations for rectangular panels in plane stress condition and for square plates in bending indicate an improvement in structural analysis when the element stiffness matrices satisfy complete boundary compatibility and boundary stress conditions. (Author)
AD-658 512 Not available from CFSTI.

A GENERAL PROCEDURE FOR THE ANALYSIS OF ELASTIC AND PLASTIC FRAMEWORKS.
Progress rept. Jun 66-Jul 67,
Illinois Univ Urbana Dept of Civil Engineering
Glenn A. Morris, and Steven J. Fenves. Aug 67, 187p Rept no. Structural Research Ser-325
Contract Nonr-1834 (03)

Descriptors: (*Structural properties, Iterative methods), Structures, Elasticity, Plasticity, Stresses, Deformation, Loading (Mechanics), Force (Mechanics).

A general procedure is presented for tracing the load-deflection characteristics of frameworks loaded through the elastic range to the plastic collapse stage. An iterative analysis procedure is employed in which the load-displacement characteristics of the structure are linearized over finite loading increments. Consecutive non-proportional load systems consisting of any arrangement of concentrated member and joint loads are considered. (Author)
AD-658 534 HC$3.00 MF$0.65

A STEADY-STATE FORMULATION FOR THE TRANSIENT RESPONSE OF A REINFORCED CYLINDRICAL SHELL IMMERSED IN A FLUID MEDIUM,
Polytechnic Inst of Brooklyn N Y Dept of Aerospace Engineering and Applied Mechanics
J. M. Klosner, and J. Berglund. 24 Aug 66, 5p
PIBAL-932
Contracts Nonr-839 (17), Nonr-839 (40)
Availability: Published in Journal of Applied Mechanics v34 n2 p487-90 Jun 1967.

Descriptors: (*Structural shells, Cylindrical bodies), (*Loading (Mechanics), Structural shells), Reinforcing materials, Steel, Pressure, Deflection, Underwater, Sea water, Equations of motion.

Numerical calculations were performed for two steel shells immersed in salt water having simple support spacings 2L = 0.3321, 6.0. The nondimensional shell deflections at tau = 0 are presented as a function of the half period (T) of the load; w sub static denotes the static displacement of the shell when subjected to a pressure of p sub o cos pi x/2L. It is seen for (2L = 0.3321) that the displacement vanishes at T = 5.2n (n = 1,2,3,...). The corresponding velocities were also found to vanish. The figure for (2L = 6.0000) reveals that within the range investigated the deflections vanish at T = 14.4 and 24. An investigation of the corresponding velocities showed that at T = 24 the velocity also vanished. (It should be noted that the series for the velocities converged very slowly.) For a spacing 2L = 0.3321, it has been shown in that the steady-state periodic motion has a period =2pi/omega sub 1 = 2.6, while for 2L = 6 the period of the steady-state periodic motion = 12. Thus, since it has previously been noted that for a system which is brought to a state of periodic motion (T/2) = n period of the steady-state periodic motion it is not unexpected that the initial conditions are satisfied when the half periods T = 5.2n and 24n, respectively. The nondimensional time-history responses of the shell are presented. A comparison with the exact solution obtained by Herman and Klosner shows excellent agreement. Of course, the steady-state solution is valid only within the intervals tau = 0 - 2.6 and 0 - 12 and in their periodic equivalent intervals. (Author)
AD-658 621 Not available from CFSTI.

CIRCULAR RING REDUNDANTS.
Information rept.,
Picatinny Arsenal Dover N J Data Processing Systems Office
Joseph E. Bay, Muriel L. Slevin, and Robert I. Isakower. Sep 67, 71p Rept no. DPSO-IR-11

Descriptors: (*Rings, Structural properties), (*Computer programs, Rings), Loading (Mechanics), Stresses, Moments, Force (Mechanics).

The use and details of a computer programmed structural analysis of closed circular rings is described. The loading on the ring may be any in-plane combination of moments and forces. Along with the redundant moments, radial shears, and circumferential tensile forces induced by the loading imposed on the ring, the program generates stress components and maximum combined stresses. The output is available in both tabular and graphical form. (Author)
AD-658 683 HC$3.00 MF$0.65

DESIGN OF TESTS FOR THE EFFECTS OF MASS FIRES ON SHELTER OCCUPANTS.

Final rept.,
Isotopes Inc Palo Alto Calif
William Lee, Helen C. Leong, Cordell Jee, and M. Gayle Hershberger. 26 Sep 66, 64p Rept no. HNS-80
NRDL-TRC-67
Contract N00228-66-C-0917

Descriptors: (*Fallout shelters, *Fires), Hazards, Radioactive fallout, Metabolism, Radiation effects, Heat, Gases, Dust, Protection, Detection, Protective clothing, Design, Control, Personnel, Human engineering, Behavior, Physiology, Survival.

An outbreak of mass fires introduces serious additional life hazard factors which may require extensive modifications or overhaul of existing concepts of shelter design, construction and management. In this report the various life hazard factors associated with mass fires and the effects these would have on shelter occupants are discussed. Experiments (both field and supporting laboratory experiments) and facilities needed to more accurately determine or predict the effects of the various hazards on shelter occupants and for development and evaluation of protective measures are described. Basic biological test design considerations and certain precautions necessary in carrying out biological experiments are discussed. (Author)
AD-658 734 HC$3.00 MF$0.65

A DYNAMIC ULTIMATE STRENGTH STUDY OF SIMPLY SUPPORTED TWO-WAY REINFORCED CONCRETE SLABS.
Final technical rept.,
Army Engineer Waterways Experiment Station Vicksburg Miss
D. R. Denton. Jul 67, 230p Rept no. AEWES-TR-1-789
Availability: Hard copy available from Army Engineer Waterways Experiment Station, Vicksburg, $3.75.

Descriptors: (*Reinforced concrete, Blast), (*Shelters, Reinforced concrete), Floors, Roofs, Shock waves, Loading (Mechanics), Dynamics, Supports.

Static and dynamic (airblast-loaded) behavior of simply supported, two-way reinforced concrete slabs was investigated. Four static and seventeen dynamic tests were conducted on slabs with clear span dimensions of 7 feet 6 inches and a thickness of 2-5/8 inches. Three series of slabs corresponding to three different percentages of steel reinforcement were subjected to uniformly distributed static loads varying from 7.1 to 11.8 psi and dynamic airblast overpressures ranging from 7.3 to 13.2 psi. Measurements of pressure, deflection, concrete surface and reinforcement strains, acceleration, and velocity were made. Three damage ranges (negligible, moderate, and severe), defined in terms of permanent midpoint deflection, are used to discuss the condition of the slabs after static and dynamic loading because none of the slabs actually collapsed or failed. Crack patterns present in the severe damage range indicated that the slabs would fail primarily in a flexural mode. However, tensile membrane action developed in the center region of the slabs at a midpoint deflection approximately equal to the depth of reinforcement, and this action accounts for the increased slab resistance when deflections become large. Static ultimate strengths of Series I, II, and III slabs were approximately 1.43, 1.38, and 1.51, respectively, times the ultimate strength predicted by a yield-line analysis with an X crack pattern. Dynamic ultimate strengths of the slabs were estimated to be 11, 13, and 15 psi for the Series I, II, and III, respectively, and these values are approximately 1.43, 1.38, and 1.27 times the static ultimate strengths. (Author)
AD-658 749 MF$0.65

BUCKLING OF UNSTIFFENED CONICAL SHELLS UNDER COMBINED LOADING,
Technion - Israel Inst of Tech Haifa
For primary bibliographic entry see Field 20K.
AD-658 815 HC$3.00 MF$0.65

CREEP STRESS CONCENTRATION OF A CIRCULAR HOLE IN AN INFINITE PLATE,
Polytechnic Inst of Brooklyn N Y Dept of Aerospace Engineering and Applied Mechanics
For primary bibliographic entry see Field 20K.
AD-658 833 HC$3.00 MF$0.65

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5A.
AD-658 834 HC$3.00 MF$0.65

ANALYTICAL AND EXPERIMENTAL STUDY OF A THROUGH TRUSS BRIDGE.
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13B.
PB-175 949 HC$3.00 MF$0.65

PHYSICAL TESTING OF MECHANICALLY SPLICED REINFORCING BAR USING A SLEEVE WITH METAL FILLER PROCESS.
California State Div. of Highways.
For primary bibliographic entry see Field 13C.
PB-176 058 HC$3.00 MF$0.65

STATISTICAL ANALYSIS OF HEAVY TRUCK TRAFFIC FOR THE STATE OF MARYLAND.
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13F.
PB-176 065 HC$3.00 MF$0.65

PERFORMANCE OF COMPOSITE LIGHTWEIGHT CONCRETE DECKS ON STEEL STRINGERS,
Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
Humphrey T. Turner, and Rodolfo J. Aguilar. 1965, 93p
Prepared in cooperation with Louisiana Dept. of Highways, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bridges, Floors), (*Reinforced concrete, Cracks), Degradation, Traffic, Volume, Tensile properties, Shrinkage, Passenger vehicles, Oscillation, Steel, Moisture, Specifications, Weather, Tables.

The report presents the results of a field and analytical study into the causes of cracking of lightweight concrete bridge slabs in Louisiana. The field study involved the determination of the present condition of 389 simply supported lightweight concrete bridge slabs built compositely with steel stringers. This included a crack size and distribution study and a determination of reinforcement embedment depth. Available construction records were reviewed, climatic conditions to which the structures had been subjected were studies along with the traffic history of each bridge. The analytical studies attempted to relate design criteria, dynamic behavior of the structure and concrete shrinkage to the present condition of the bridge. Some of the conclusions presented were: There appears to be no reasonable relationship between slab deterioration and most of the variables involved in design and construction. If the concrete cover was less than 3/4 inches, the cracks tended to coincide with reinforcement orientation. If the cover was larger, no relationship between cracks and reinforcement orientation existed. Shrinkage strains as analytically determined are as great as the approximate tensile strength of the concrets. The dynamic behavior analysis pointed to the supposition that for some span length and loading combinations, crack propagation is caused mainly by oscillations due to moving vehicles. (Author)
PB-176 067 HC$3.00 MF$0.65

INFLUENCE OF BEAM SIZE ON THE SHEARING FRACTURE OF MORTAR AND CONCRETE BEAMS,
Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
M. A. Cassaro, and Joseph Csercsics. Jan 67, 85p
Prepared in cooperation with Florida State Road Dept., and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Beams (Structural), *Construction materials), (*Concrete, *Fracture (Mechanics)), Crack propagation, Analysis of variance, Interactions, Civil engineering, Failure (Mechanics), Strain (Mechanics), Loading (Mechanics).

The object of this paper is to determine the size effect and also to compare the effects of a mortar mix and a limestone aggregate mix on the diagonal tension fracture of concrete beams. The scope of the investigation is limited to a determination of the nature of the influence of a typical Florida limestone aggregate on concrete fractures.
PB-176 072 HC$3.00 MF$0.65

INSULATION OF BRIDGE DECKS FOR ICE PREVENTION AND REDUCTION OF FREEZE-THAW CYCLES.
Departmental Research rept.,
Texas Highway Dept. Bridge Div.
H. D. Butler. Feb 66, 77p RR-62-1F
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bridges, *Surfaces), (*Ice, Bridges), (*Surface properties, Bridges), Thermal insulation, Effectiveness, Temperature, Surface properties, Railroads, Thickness, Freezing, Texas.

The effectiveness of insulating a bridge deck for ice prevention and reduction of freeze-thaw cycles is reported. The site selected for this study was the twin structures which carry U. S. Highway 287 over the Fort Worth and Denver Railroad in Wichita Falls, Texas. The west structure was insulated with sprayed urethane foam 3/4-inch thick for the south one-half and 1 1/4-inch thick for the north one half. The adjacent structure was not insulated and served as the control structure. Temperature data was collected for various locations within the bridge slabs and analyzed. Results of this analysis show that there was no reduction in the number of freeze-thaw cycles due to the insulation; however, the average freeze-thaw cycle length for the top surface of the insulated slab between I-beams was approximately two hours shorter than the cycle length for the uninsulated slab. (Author)
PB-176 076 HC$3.00 MF$0.65

VIRGINIA PILE MANUAL. VOLUME II. PILE DRIVING RECORDS,
Virginia Univ., Charlottesville. Dept. of Civil Engineering.
H. Gordon Larew, and Fred C. McCormick. Jun 67, 42p
Prepared in cooperation with Virginia Dept. of Highways, and Bureau of Public Roads, Washington, D. C. See also VOL 1, PB-176 078 and VOL 2 PB-176 075.

Descriptors: (*Bridges, *Foundations (Structures)), Roads, Loading (Mechanics), Captive tests, Data storage systems, Structural parts, Construction, Failure (Mechanics), Soils, Design, Statistical data, Penetration, Civil engineering, Experimental data, Site selection, Virginia.

The study was divided into two phases: a compilation of statistical data pertaining to pile founda-

tions constructed in previous years and a combination experimental-analytical study of individual piles located in Virginia which were loaded to failure. A detailed description of the procedures used and the findings are presented in three volumes. The data compilation phase provided statistics on approximately five-hundred bridges useful to location and design personnel, concerned with site selection and future structure construction. Pile load-test information was obtained from original field studies and from existing records of load tests to failure conducted by other organizations. An analytical method for predicting the static load bearing capacity of a single pile evolved from these studies. A broad coverage of current pile driving techniques is presented. (Author)
PB-176 077 HC$3.00 MF$0.65

VIRGINIA PILE MANUAL. VOLUME I. GENERAL INFORMATION,
Virginia Univ., Charlottesville. Dept. of Civil Engineering.
H. Gordon Larew, and Fred C. McCormick. Jun 67, 129p
Prepared in cooperation with Virginia Dept. of Highways, and Bureau of Public Roads, Washington, D. C. See also Vol 2, PB-176 077 and Vol 3, PB-176 075.

Descriptors: (*Bridges, *Foundations (Structures)), Roads, Loading (Mechanics), Captive tests, Structural parts, Construction, Failure (Mechanics), Soils, Design, Statistical data, Penetration, Civil engineering, Site selection, Experimental data, Virginia.

The study was divided into two phases: a compilation of statistical data pertaining to pile foundations constructed in previous years and a combination experimental-analytical study of individual piles located in Virginia which were loaded to failure. A detailed description of the procedures used and the findings are presented in three volumes. The data compilation phase provided statistics on approximately five-hundred bridges useful to location and design personnel, concerned with site selection and future structure construction. Pile load-test information was obtained from original field studies and from existing records of load tests to failure conducted by other organizations. An analytical method for predicting the static load bearing capacity of a single pile evolved from these studies. A broad coverage of current pile driving techniques is presented. (Author)
PB-176 078 HC$3.00 MF$0.65

STATIC BEHAVIOR OF CONTINUOUS COMPOSITE BEAMS,
Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.
J. Hartley Daniels, and John W. Fisher. Mar 67, 86p 324.2
Research supported in part by Bureau of Public Roads, Washington, D. C.

Descriptors: (*Beams (Structural), Fatigue (Mechanics)), (*Composite materials, Beams (Structural)), Flexural strength, Reinforced concrete, Steel, Design, Shear stresses, Buckling (Mechanics), Plastics, Structural parts, Roads, Deflection, Cracks, Strain (Mechanics), Captive tests.

The results of ultimate strength tests of four continuous composite steel-concrete beams are presented in the report. Each beam had two equal spans of 25 feet and consisted of a 60 inch wide by 6 inch reinforced concrete slab connected to a 21WF62 A36 steel beam with 3/4 inch diameter stud shear connectors. The beams had been subjected to fatigue tests prior to the ultimate strength tests. Some conclusions based on the test results were as follows: Shear connectors designed on the basis of the static and fatigue requirements will provide sufficient shear connection to develop the ultimate flexural strength of the member. Plastic analysis and ultimate strength theory can be used for the design of continuous composite beams. Local flange and web buckling near the interior supports limits the ultimate load capacity of the member; further analytical and experimental studies are required to establish design rules which would allow the full negative plastic hinge to develop prior to flange and web local buckling.
PB-176 106 HC$3.00 MF$0.65

EPOXY BONDED COMPOSITE T-BEAMS FOR HIGHWAY BRIDGES.
Final rept.,
Arizona Univ., Tucson. Engineering Experiment Station.
James D. Kriegh. Jun 67, 62p
Research supported in part by Bureau of Public Roads, Washington, D. C. and Arizona Highway Dept.

Descriptors: (*Bridges, *Beams (Structural)), Steel, Corrosion, Epoxy plastics, Moisture, Concrete, Bonding, Floors, Adsorption, Roads, Tables, Visual inspection, Tests.
Identifiers: Aggregates (Materials).

Tests to determine the causes of rust formation on steel beams joined to concrete by a layer of epoxy are reported. Specifically, the following variables were investigated: Thickness of epoxy vs. moisture absorption, variation in mixing methods (hand vs. machine mixing) aggregate type and properties, and variations in the time of placement of the concrete deck on the epoxy layer. Some of the tests were performed on concrete cylinders, others on larger steel beams. Based on these tests, the author concludes that occurrence of rust spots can be prevented if: Clean, dry aggregates of low moisture absorbing properties only are used, and the pre-cured epoxy system is adhered to. (Author)
PB-176 107 HC$3.00 MF$0.65

STATIC BEHAVIOR OF COMPOSITE BEAMS WITH VARIABLE LOAD POSITION,
Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.
J. Hartley Daniels, and John W. Fisher. Mar 67, 57p 324.3
Research supported in part by Bureau of Public Roads, Washington, D. C.

Descriptors: (*Beams (Structural), *Captive tests), Composite materials, Steel, Reinforced concrete, Flexural strength, Loading (Mechanics), Structural parts, Roads, Strain (Mechanics), Instrumentation, Mechanical properties, Studs, Design.

The report presents the results of static tests on two identical composite steel-concrete beams. Each beam had a span of 25 feet and consisted of a 60-in. wide by 6-in. reinforced concrete slab connected to a 21WF62 A36 steel beam with 3/4 inch diameter by 4-in. high headed steel stud shear connectors. One beam was loaded at midspan to its ultimate load. The ultimate load was then applied at five consecutive positions between the support and midspan to simulate a single concentrated moving load on the second beam. From the results of the tests it was concluded that such composite beams designed in accordance with static flexural strength requirements will be able to develop the ultimate flexural strength as the load passes across the beam from the support to the position of maximum moment. (Author)
PB-176 108 HC$3.00 MF$0.65

DISCRETE ANALYSIS OF CONTINUOUS FOLDED PLATES,
Illinois Univ., Urbana. Dept. of Civil Engineering.
A. Karim Conrado, and W. C. Schnobrich. Mar 67, 100p Structural Research Ser-321
Grant NSF-GK-538

Descriptors: (*Structures, *Bridges), (*Metal plates, Structures), Elasticity, Tensile properties, Angle bars, Construction, Deflection, Flexural strength, Thickness, Shear stresses, Deformation, Theses, Partial differential equations, Strain (Mechanics), Civil engineering.

A prismatic folded plate structure consists of a series of rectangular plates connected along their longitudinal edges and supported transversely by two or more diaphragms or frames. The main field of application of this type of construction is for structures where relatively large spans are required such as hangars, auditoriums and industrial buildings. The material quantities in folded plate construction are slightly higher than the quantities required when singly or doubly curved shells are used. Offsetting this increase in material usage, easier formwork and concreting frequently make the application of folded plates more economical than curved shell systems. In addition, the corrugations formed in the folded plate system may be used for ducts and utility troughs. (Author)
PB-176 124 HC$3.00 MF$0.65

14. METHODS AND EQUIPMENT

14A. Cost Effectiveness

SOME COMMENTS ON SYSTEMS ANALYSIS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-658 426 HC$3.00 MF$0.65

COST-EFFECTIVENESS ANALYSIS FOR THE FIRE SERVICE: AN OVERVIEW.
Professional paper,
System Development Corp Santa Monica Calif
Hilton F. Jarrett. 2 Sep 67, 20p Rept no. SP-2938

Descriptors: (*Cost effectiveness, Reviews), (*Fire safety, Management planning), Decision making, Optimization, Supervisory personnel, Models (Simulations), Systems engineering, Analysis.

The report examines the technique of cost-effectiveness analysis, including its advantages and limitations, and discusses its potential usefulness to the fire service. (Author)
AD-658 471 HC$3.00 MF$0.65

PARALLEL AND SEQUENTIAL STRATEGIES FOR R AND D PROJECTS.
Harvard Univ Cambridge Mass Graduate School of Business Administration
For primary bibliographic entry see Field 5A.
AD-658 544 Not available from CFSTI.

A PARAMETRIC APPROACH TO THE EVALUATION OF MILITARY INFORMATION SYSTEMS,
Bunker-Ramo Corp Mclean Va
For primary bibliographic entry see Field 15G.
AD-658 737 HC$3.00 MF$0.65

SOME LINEAR PROGRAMMING APPLICATIONS TO STOCKAGE PROBLEMS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 15E.
AD-658 823 HC$3.00 MF$0.65

14B. Laboratories, Test Facilities, and Test Equipment

A SOLID STATE POLARIMETER SUITABLE FOR ROCKETBORNE IONOSPHERIC DIFFERENTIAL ABSORPTION MEASUREMENTS,
Pennsylvania State Univ University Park Ionosphere Research Lab

For primary bibliographic entry see Field 4A.
AD-658 451 HC$3.00 MF$0.65

STUDIES OF AIRGLOW AND AURORA PHENOMENA USING INSTRUMENTATION TECHNIQUES.
Northeastern Univ Boston Mass
For primary bibliographic entry see Field 4A.
AD-658 466 HC$3.00 MF$0.65

ON THE CONSTRUCTION OF ORTHOGONALIZED SQUARES BY FINITE FIELDS.
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 12B.
AD-658 468 HC$3.00 MF$0.65

DESIGN FOR ORIENTATION BALLOON-BORNE EQUIPMENT,
Minnesota Univ Minneapolis Cosmic Ray Group
Gerald A. Anderson. Jun 67, 19p Rept no. CR-96
Contract Nonr-710 (60)
Research supported in part by NASA.

Descriptors: (*Meteorological balloons, *Instrumentation), (*Cosmic ray telescopes, Alignment), Design, Magnetometers, Optical equipment, Rotation, Detectors, Scintillation counters, Mechanical drawing, Suspension devices, Circuits, Accuracy, Cameras.

Presents the design of a system to orientate a balloon-borne instrument package about a vertical axis. Pointing accuracy obtained is plus or minus 1.5 degrees. An independent photographic recording system measures the azimuth angle with respect to the star Polaris to plus or minus 0.1 degrees. The instrument package is rotated against a light weight reaction wheel which is designed for maximum moment of inertia. A pulse-width modulation system is used to drive the orientation motor. A fluxgate magnetometer, used for the sensor element, causes the instrument package to be orientated with respect to the horizontal component of the earth's field. The instrument, a gamma-ray telescope, is oriented in the north-south plane and is tilted at an angle with the vertical which will correspond with the elevation of the suspected gamma-ray source when the source crosses the local meridian. (Author)
AD-658 529 HC$3.00 MF$0.65

DEVICE FOR CHECKING THE CAPACITY OF AN OIL PUMP,
Department of the Army Washington D C
B. A. Sharoglazov, and V. V. Belyaev. 21 Aug 67, 2p Rept no. J-2702
Ustroistvo dlya Proverki Proizvoditelnosti Maslyanogo Naosa, trans. of Patent (USSR) 179 020, appl. 917657/24-6, 18 Aug 64, pub. in Byulleten Izobretenni i Tovarnykh Znakov (USSR), n4 p1-2 1966.

Descriptors: (*Lubricant pumps, *Test equipment), USSR, Hydraulic pressure pumps, Patents, Internal combustion engines.

A device is described to check the capacity of the oil pump of an internal-combustion engine, containing a sleeve with delivery and overflow lines series-connected with it and a plunger to vary the cross section of the latter, characterized by the fact that in order to check the pump on an operating engine lines are mounted on an assembly plate for connection to the oil line, and an auxiliary line is connected parallel to the overflow line. In order to create the desired optimum pressure in the oil system, a throttle is installed in the overflow line. (Author)
AD-658 531 HC$3.00 MF$0.65

THE EXPERIMENTAL DETERMINATION OF THE RUDDER FORCES AND RUDDER TORQUE OF A MARINER CLASS SHIP MODEL,
California Univ Berkeley Coll of Engineering
For primary bibliographic entry see Field 13J.
AD-658 539 HC$3.00 MF$0.65

DIRECTIONAL WAVE SPECTRA MEASUREMENTS OF THE CHESAPEAKE BAY BENEATH THE BAY BRIDGE.
Stevens Inst of Tech Hoboken N J Davidson Lab
For primary bibliographic entry see Field 8C.
AD-658 542 HC$3.00 MF$0.65

SPIN GENERATOR,
Foreign Technology Div Wright-Patterson AFB Ohio
N. M. Ievskaya, and R. M. Umarkhodzhaev. 5 May 67, 25p Rept no. FTD-HT-66-470 TT-67-62913
O Spinovom Generatore, trans. of Elektrichestvo (USSR) n7 p57-64 1965.

Descriptors: (*Nuclear magnetic resonance, Instrumentation), Nuclear spins, Generators, Radiofrequency spectroscopy, Magnetometers, USSR.

Theoretical and experimental investigations of a spin generator show that this type of instruments can find and is finding application in the various fields of science and technology where it is necessary to make an accurate tracking of the intensity of a constant magnetic field: in magnetometers, is constant magnetic field stabilizers, and also in spectrometers of nuclear magnetic resonance. The use of a spin generator in magnetometry permits continuous control over field intensity changes which has an unconditional advantage in comparison with the free precession method. The use of a spin generator for measuring and stabilizing a constant magnetic field intensity in comparison with the use of a passive line of nuclear magnetic resonance increases the attainable accuracy, since the stability of a spin generator is considerably higher than 1/Q where Q is the quality of a passive line of nuclear magnetic resonance. (Author)
AD-658 652 HC$3.00 MF$0.65

BIAXIAL TENSILE TESTER FOR FABRICS.
Fabric Research Labs Inc Dedham Mass
For primary bibliographic entry see Field 11E.
AD-658 684 HC$3.00 MF$0.65

ANALYSIS OF MECHANICAL TESTING PROCEDURE FOR BRITTLE MATERIALS.
IIT Research Inst Chicago Ill
For primary bibliographic entry see Field 20K.
AD-658 695 HC$3.00 MF$0.65

REFRACTOMETRIC SENSING OF H2SO4 SPECIFIC GRAVITY IN LEAD-ACID CELL OPERATION,
Naval Research Lab Washington D C
For primary bibliographic entry see Field 10C.
AD-658 747 HC$3.00 MF$0.65

NANOSECOND RISETIME, HIGH POWER, VARIABLE DELAY DOUBLE PULSER WITH APPLICATION TO ELECTRON-HOLE PLASMAS,
Boeing Scientific Research Labs Seattle Wash
William P. Robbins, Robert M. Lantz, and Betsy Ancker-Johnson. Aug 67, 29p Rept no. D1-82-0628
Prepared in cooperation with Washington Univ., Seattle.

Descriptors: (*Plasma medium, *Semiconductors), (*Pulse generators, Manufacturing methods), Test equipment, Performance (Engineering), Oscilloscopes, Trigger circuits, Coaxial cables, Wiring diagrams.

A new double pulse system has been designed and tested which offers several advantages over previous methods of generating and delaying one squarewave pulse with respect to another. Characteristics of the new system are, fast rise and fall times (2 nanoseconds typical); high power pulses (150 V into 50 ohms); very low time jitter (less than 0.2% of pulse separation time); accurate repeatability of time delay plus or minus 1% typical); extremely wide range of time delay (nanoseconds to milliseconds); d.c. readout of the time separation of the two pulses accurate to plus or minus 1% and suitable for x-y pen recorders. A special summing junction circuit allows both pulses to be applied to the same load without power being split between the load and the other pulse generator, and also without the first pulse prematurely triggering the second pulse or affecting its amplitude. Some results obtained by applying this system to the study of electron-hole plasma decay are briefly presented. (Author)
AD-658 773 HC$3.00 MF$0.65

VAN ALLEN BELT SIMULATION.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 22B.
AD-658 780 Not available from CFSTI.

CRITERIA FOR SELECTING SOLID ROCKET MOTORS AS TRACK TEST PROPULSION,
Air Force Missile Development Center Holloman AFB N Mex Directorate of Test Track
Hans J. Rasmussen. Jun 67, 47p
MDC-TR-67-76

Descriptors: (*Rocket-propelled sleds, *Rocket motors (Solid propellant)), Selection, Equations of motion, Propulsion, Standards, Design, Cost effectiveness, Performance (Engineering), Acceleration.

Closed form solutions of the simplified equation of motion of a rocket sled are used to define specific characteristics governing the applicability of individual solid rocket motors for track test propulsion purposes. Some of the interactions between motor performance parameters, sled design considerations, and track length constraints are reviewed. Criteria are developed for determining applicability ranges and performance limits of various rocket units, and to arrive at a basis for comparing the relative cost effectiveness of competing motors for rocket sled operation. (Author)
AD-658 841 HC$3.00 MF$0.65

SOME BASIC TECHNICAL CONSIDERATIONS FOR THE DEVELOPMENT OF ROCKET SLEDS FOR THE HYPERSONIC SPEED REGIME,
Air Force Missile Development Center Holloman AFB N Mex Directorate of Test Track
Hans J. Rasmussen. Jun 67, 53p
MDC-TR-67-77

Descriptors: (*Rocket-propelled sleds, Hypersonic test vehicles), Tests, Aerodynamic heating, Friction, Design, Configuration.

Basic technical considerations for layout, design, and operation of hypersonic rocket sleds are reviewed and summarized on the basis of experience collected during experimental monorail sled runs. Emphasis is placed on selected aspects of aerodynamics, frictional and aerodynamic heating, and technological problems at the sled-rail interface. (Author)
AD-658 842 HC$3.00 MF$0.65

INFRARED RADIANCE OF SELECTED TERRAIN FEATURES AS VIEWED FROM HIGH ALTITUDE,
Denver Univ Colo Dept of Physics
For primary bibliographic entry see Field 20F.
AD-658 866 HC$3.00 MF$0.65

A STUDY OF THE ELECTRIC DEFLECTION OF MOLECULAR BEAMS.
Annual summary rept.,
Midwest Research Inst Kansas City Mo
Frank T. Greene, and Thomas A. Milne. Aug 67, 28p
AFOSR-67-1971
Contract AF 49 (638)-1724
See also AD-637 176.

Descriptors: (*Molecular beams, Deflection), Mass spectroscopy, Instrumentation, Electric fields, Electric moments, Dipole moments, Polarization.

A UHV molecular beam apparatus with a mass spectrometric detector, which is to be used for the measurement of dipole moments and polarizabilities was completed and is performing satisfactorily. The system, which is now undergoing final tests, is sufficiently sensitive to allow the study of species generated at pressures of less than 0.0001 torr. (Author)
AD-658 903 HC$3.00 MF$0.65

A HALL FOUR-POINT PROBE ON THIN PLATES THEORY AND EXPERIMENT.
Stanford Univ Calif Stanford Electronics Labs
For primary bibliographic entry see Field 20L.
AD-658 913 Not available from CFSTI.

CORED CATHODE FOR STABILIZATION OF THE dc ARC,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
J. W. Mellichamp. 27 Nov 64, 5p
Availability: Published in Applied Spectroscopy v21 n1 Jan-Feb 1967.

Descriptors: (*Spectrometers, Electric arcs), (*Electric arcs, *Cathodes), Electric discharges, Direct current, Electrodes, Materials, Carbonates, Barium compounds, Lithium compounds, Graphite, Electrical properties.

The stability of the dc arc can be increased by the use of a cathode that is cored with a material containing an element of an ionization potential lower than carbon. An effective core material developed for spectrochemical analysis is a 1:2 mixture of BaCO3 or Li2CO3 and graphite powder. In the arc, the added element forms a stationary positive-ion cloud at the tip of the cathode and acts as a ballast to electron flow. Arc temperature is not lowered, as is frequently the case when a buffer is added to the anode. Current and voltage fluctuations and arc wandering are reduced, as indicated by recordings during sample consumption. Several hundred sample materials have been tested to determine the usefulness of the cored cathode. (Author)
AD-658 950 Not available from CFSTI.

FACILITIES FOR SIMULATING ATTITUDE MOTION OF SPACECRAFT,
Redstone Scientific Information Center Redstone Arsenal Ala
Herbert H. Hoop. Jun 67, 51p Rept no. RSIC-679

Descriptors: (*Spacecraft, *Attitude control systems), (*Test facilities, Spacecraft), Gas bearings, Motion, Control systems, Sensors, Power, Data transmission systems, Simulators, Operation, Design.

The report describes facilities using gas bearings in attitude motion simulators for the development of spacecraft attitude control systems. Typical facility information includes discussions on test chamber, bearing, platform, power requirements, balance consideration, testing procedure, attitude reference sources, sensors, and data transmission. Facilities at twelve Government and industrial organizations are discussed. (Author)
AD-658 990 HC$3.00 MF$0.65

WIND TUNNEL TEST STUDY.
Final engineering rept. (Part 1), 25 Jan-1 Apr 58.
Collins Radio Co Cedar Rapids Iowa Aeronautical Research Lab
1 Jun 58, 84p Rept no. CER-826-Pt-1
Contract DA-44-177-TC-448
See also AD-658 996.

Descriptors: (*Wind tunnel models, Model tests), Wind tunnels, Aerodynamic configurations, Aerodynamic characteristics, Hovering, Flight, Pitch (Motion), Yaw, Roll.

The report includes information pertaining to the construction and testing of the CARV (Chrysler Aerial Research Vehicle). This wind tunnel test model was constructed and tested. The first part of the test program covered the following investigations: (a) Vane effectiveness in hovering. (b) Forward flight conditions for tandem configuration. (c) Forward flight conditions for abreast configuration. (d) Finding a method to reduce the positive pitching moment.
AD-658 995 HC$3.00 MF$0.65

WIND TUNNEL TEST STUDY.
Final engineering rept. (Part 2), 1 Apr-16 May 58.
Collins Radio Co Cedar Rapids Iowa Aeronautical Research Lab
1 Jun 58, 71p Rept no. CER-826-Pt-2
Contract DA-44-177-TC-448
See also AD-658 995.

Descriptors: (*Wind tunnel models, Model tests), Pitch (Motion), Flight, Stability, Propellers (Aerial), Control surfaces, Aerodynamic configurations, Moments.

The test results are discussed in the following order: (a) Devices to reduce the nose up pitching moment in forward flight. (b) Determination of trim points, and stability and control work. (c) Miscellaneous tests.
AD-658 996 HC$3.00 MF$0.65

METHODS FOR INSTALLING THE IBL MINIATURE PRESSURE GAGE.
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 19D.
AD-658 999 HC$3.00 MF$0.65

ADVANCEMENT OF ULTRASONIC TECHNIQUES USING RERADIATED SOUND ENERGIES FOR NONDESTRUCTIVE EVALUATION OF WELDMENTS.
Automation Industries Inc Boulder Colo Research Div
For primary bibliographic entry see Field 13H.
AD-659 033 HC$3.00 MF$0.65

BALLOON BORNE TELESCOPE FEASIBILITY STUDY AND DESIGN.
American Optical Co Pittsburgh Pa J W Fecker Div
For primary bibliographic entry see Field 17H.
AD-659 051 HC$3.00 MF$0.65

THE DTMB PLANAR-MOTION-MECHANISM SYSTEM.
Naval Ship Research and Development Center Washington D C Hydromechanics Lab
For primary bibliographic entry see Field 20D.
AD-659 053 HC$3.00 MF$0.65

TOLERANCE PHILOSOPHY,
Army Missile Command, Redstone Arsenal, Ala. PERSHING Project Manager's Office.
William E. Keeling. Jun 67, 42p

Descriptors: (*Tolerances (Mechanics), Philosophy), (*Test equipment, Tolerances (Mechanics)), Standards, Probability, Statistical distributions, Systems engineering, Calibration, Acceptability, Design, Maintenance.

The report is designed to establish the interdependency of test equipment tolerance limits to other parameters of system design and to establish a general tolerance philosophy. Included is a graphical development of tolerance philosophy and a derivation of applicable tolerance handling formulas. The central theme of the report proves that test equipment tolerance is a dependent function of a parameter called delta sigma and is basically unrelated to the item under test tolerance. This theme is then expanded to include other elements necessary to establish an overall tolerance philosophy for use by the Government, contractors, and designers. Also included are some of the relationships of mathematical tolerance manipulation to the laws of distribution probability, particularly as they relate to the incorrect presumptions currently employed. (Author)
AD-816 406 HC$3.00 MF$0.65

REALISTIC UNCERTAINTIES AND THE MASS MEASUREMENT PROCESS: AN ILLUSTRATED REVIEW,
National Bureau of Standards, Washington. D. C. Inst. for Basic Standards.
P. E. Pontius, and J. M. Cameron. 15 Aug 67, 21p
Hard copy available from the Superintendent of Documents, GPO, Washington, D. C. 20402, $0.20.

Descriptors: (*Weight, Measurement), (*Standards, Weight), Calibration, Accuracy, Gravity, Force (Mechanics), Tolerances (Mechanics), Performance (Engineering), Sensitivity, Uncertainty, Quality control, Laboratory equipment.

This paper gives a review of the concepts and operations involved in measuring the mass of an object. The importance of viewing measurement as a production process is emphasized and methods of evaluating process parameters are presented. The use of one of the laboratory's standards as an additional unknown in routine calibration provides an accuracy check and, as time goes on, the basis for precision and accuracy statements. (Author)
NBS-MONO-103 HC$0.20 MF$0.65

FEASIBILITY STUDY FOR A HYDROGEN GAS LEAK DETECTION SYSTEM AS REQUIRED FOR USE ON INFLIGHT EXPERIMENTS FINAL REPORT, 1 JUL. 1966 - 25 JAN. 1967.
Raytheon Co., Sudbury, Mass. Space and Information Systems Div.
25 Jan 67, 107p NASA-CR-88629, U67-4041
Contract NAS8-18041

Descriptors: *Detector, *Hydrogen, *In-flight monitoring, *Saturn ib launch vehicle, Atmosphere, Breadboard, Cryogenic, Helium, Insulation, Leakage, Model, Propellant, Region, Storage, Tank.

For abstract, see STAR 05 21.
N67-35358 HC$3.00 MF$0.65

STUDY OF LOW PRESSURE APPLICATION OF THE ORBITRON.
Midwest Research Inst., Kansas City, Mo.
P. J. Bryant, and C. M. Gosselin. Sep 67, 24p
NASA-CR-886
Contract NAS1-6279

Descriptors: *Gas pressure, *Ionization gauge, *Low pressure chamber, *Performance characteristics, *Vacuum system, Chamber, Comparison, Current, Curve, Electron, Evaluation, Gas, Gauge, Ionization, Low pressure, Measurement, Modulation, Performance, Pressure, Ratio, Response, Sensitivity, System, Vacuum.

For abstract, see STAR 05 21.
N67-35672 HC$3.00 MF$0.65

DETERMINATION OF BOUNDARY REFLECTED DISTURBANCE LENGTHS IN THE LANGLEY 16-FOOT TRANSONIC TUNNEL.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
F. J. Capone, and E. M. Coates, Jr.. Sep 67, 70p
NASA-TN-D-4153
Contract 126-13-01-08-23

Descriptors: *Bow shock, *Transonic wind tunnel, Body, Boundary, Bow, Cone, Cylinder, Disturbance, Length, Mach number, Maximum, Model, Ogive, Reflection, Shock, Test, Transonic, Tunnel, Wind.

For abstract, see STAR 05 21.
N67-35732 HC$3.00 MF$0.65

THE APPLICATION OF LIQUID CRYSTALS FOR THERMOGRAPHIC TESTING OF BONDED STRUCTURES.
Lockheed-georgia Co., Marietta. Proficiency Development Lab.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 05 21.
N67-35747 HC$3.00 MF$0.65

AUTOMATION OF A PHILIPS X-RAY SPECTROGRAPH.
United Kingdom Atomic Energy Authority, Harwell (England). Atomic Energy Research Establishment.
J. T. Campbell, and T. Hammond. Feb 67, 34p
AERE-R-4534

Descriptors: *Automation, *X-ray spectrography, Angle, Continuous, Count, Fluorescence, Operation, Recording, Spectrography, Time, X-ray.

For abstract, see STAR 05 21.
N67-35847 HC$3.00 MF$0.65

THE ACCURACY OF PRESSURE TRANSDUCERS WHEN USED IN SHORT-DURATION WIND-TUNNEL FACILITIES.
Ministry of Technology, London (England). Aeronautical Research Council.
L. Pennelegion, B. Redston, and K. Wilson. 1967, 43p ARC-CP-949, NPL-AERO-1213

Descriptors: *Pressure transducer, *Wind tunnel, Acceleration, Accuracy, Calibration, Flow, Measurement, Pressure, Sensitivity, Transducer, Tunnel, Wind.

For abstract, see STAR 05 21.
N67-36153 HC$3.00 MF$0.65

THE UTILIZATION OF THE HOLOGRAPH IN THE AREA OF AERODYNAMICS.
Institut Franco-allemand de Recherches, St. Louis (France).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 21.
N67-36284 HC$3.00 MF$0.65

CALIBRATION STANDARDS FOR PHOTON SPECTROSCOPY BETWEEN 20-200 KE V.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
S. S. Holt. Sep 67, 18p NASA-TM-X-55912, X-611-67-433

Descriptors: *Calibration, *Photon, *Spectroscopy, Counter, Crystal, Doping, Drift, Germanium, Intensity, Line, Lithium, Photodetector, Scintillator, Solid, Standard, State.

For abstract, see STAR 05 21.
N67-36459 HC$3.00 MF$0.65

HOT-WIRE CALORIMETRY: THEORY AND APPLICATION TO ION ROCKET RESEARCH.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 21C.
PB-175 905 HC$3.00 MF$0.65

DESIGN AND DEVELOPMENT OF ULTRASONIC SCOUR METER MODEL 1055.
Automation Industries, Inc., Boulder, Colo. Research Lab.
For primary bibliographic entry see Field 13B.
PB-175 920 HC$3.00 MF$0.65

OPERATION AND MAINTENANCE MANUAL FOR ULTRASONIC SCOUR METER MODEL 1055, APPENDIX B.
Automation Industries, Inc., Boulder, Colo. Research Lab.
For primary bibliographic entry see Field 13B.
PB-175 921 HC$3.00 MF$0.65

A TAPE PROGRAMMED SEQUENTIAL SAMPLER,
National Center for Atmospheric Research, Boulder, Colo.
For primary bibliographic entry see Field 4B.
PB-175 925 HC$3.00 MF$0.65

AN INVESTIGATION OF AGGREGATE-ASPHALT ADHESION BY MEASUREMENT OF HEATS OF IMMERSION.
Montana Coll. of Mineral Science and Technology, Butte.
For primary bibliographic entry see Field 13C.
PB-175 933 HC$3.00 MF$0.65

RELIABILITY OF CAN-TYPE PRECIPITATION GAGE MEASUREMENTS.
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 4B.
PB-175 934 HC$3.00 MF$0.65

DIABLO TEST TRACK NOISE AND VIBRATION MEASUREMENTS.
Wilson, Ihrig and Associates, Inc., Berkeley, Calif.
For primary bibliographic entry see Field 13F.
PB-175 935 HC$3.00 MF$0.65

DEVELOPMENT OF INSTRUMENT FOR NONDESTRUCTIVE MEASUREMENT FOR CONCRETE PAVEMENT THICKNESS.
Texas Highway Dept. Materials and Tests Div.
For primary bibliographic entry see Field 13B.
PB-175 948 HC$3.00 MF$0.65

SUBGRADE MOISTURE VARIATIONS. A PRELIMINARY STANDARDIZATION AND CALIBRATION PROCEDURE FOR NUCLEAR DEPTH MOISTURE/DENSITY GAGES.
Interim rept. no. 3,
Oklahoma State Univ., Stillwater. School of Civil Engineering.
E. W. LeFevre, and P. G. Manke. May 67, 73p
Rept. no. 0999
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. Part 1, see also PB-175 739 and Part 2, PB-175 740.

Descriptors: (*Pavements, Moisture), (*Hygrometers, Calibration), Sensitivity, Limestone, Density, Gravel, Clay, Standards, Measurement, Nuclear spectroscopy, Shale, Detection, Soils, Probes, Standardization.

The report is a study that involves the measurement of subgrade moisture variations and their effect on pavement performance. The report concerns the construction of laboratory standards for use in periodic checking of depth nuclear moisture-density gages and the development of a tentative calibration procedure for the gages. Materials used in the adopted laboratory standards were: crushed limestone, river gravel and Permian red clay. By preparing these standards at various densities and moisture contents, a calibration curve for moisture and another for density was obtained for each material, and represented the normal materials to be encountered in Oklahoma. The density calibration curves for crushed limestone and river gravel were identical; therefore, density data for those two materials and the Permian red clay were combined in a single graph and a recommended median density calibration curve was prepared for field use of the density probe. It was reported that, for the median curve developed for field use of the nuclear gages in the research study, 'for a given percent standard count the wet density of the material within plus or minus 4 pcf can be determined from the curve.' There was considerable scatter of moisture data obtained by use of the nuclear probe in the various materials, and at higher moisture contents the median curve varied greatly from calibration curves supplied by the manufacturer. (Author)
PB-175 950 HC$3.00 MF$0.65

SOME RECENT FINDINGS IN FLEXIBLE PAVEMENT RESEARCH.
Texas Transportation Inst., College Station.
For primary bibliographic entry see Field 13B.
PB-176 060 HC$3.00 MF$0.65

RADAR TEST SET AN/APM-267 (XN-1).
Naval Air Systems Command, Washington, D. C.
For primary bibliographic entry see Field 9C.
PB-176 070 HC$3.00 MF$0.65

OSCILLOSCOPES 535, 545 RM-35, RM-45, 945 AN/USM-120 (TEKTRONIX).
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-176 116 HC$3.00 MF$0.65

DESIGNS AND DESCRIPTIONS OF MECHANICAL SAMPLERS IN USE AT GRAND JUNCTION, COLORADO.
Pitkin (Lucius) Inc., Grand Junction, Colo. Western Uranium Project.
15 Dec 66, 22p
Contract AT (05-1)-912

Descriptors: (*Samplers, Design), (*Uranium, Sampling), Particle size, Moisture, Packaging, Test equipment.

For abstract, see NSA 21 19.
RMO-3007 HC$3.00 MF$0.65

14C. Recording Devices

A HIGH SPEED DIGITAL RECORDER FOR ATMOSPHERIC NOISE (SFERIC) WAVEFORMS,
Naval Ordnance Lab Corona Calif
For primary bibliographic entry see Field 4A.
AD-658 722 HC$3.00 MF$0.65

AN ELECTRONIC WAVE-HEIGHT MEASURING APPARATUS.

David Taylor Model Basin Washington D C
For primary bibliographic entry see Field 20D.
AD-659 031 HC$3.00 MF$0.65

SERVO CONTROL AND DATA SYNCHRONIZATION STUDY.
Borg-warner Controls Div., Borg-warner Corp., Santa Ana, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
B. Bejach. 15 Jun 67, 10p NASA-CR-88197, REPT.-70-007-Q2
Contracts NAS7-100, JPL-951659
Prepared for Jpl

Descriptors: *Data retrieval, *Magnetic tape recorder, *Servocontrol, *Synchronization, Breadboard, Circuit, Clock, Data, Magnetic, Rate, Recorder, Retrieval, Tape, Testing.

For abstract, see STAR 05 21.
N67-35754 HC$3.00 MF$0.65

14D. Reliability

INCREASED RESISTANCE OF CRYSTAL UNITS AT OSCILLATOR NOISE LEVELS,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
For primary bibliographic entry see Field 9A.
AD-658 947 Not available from CFSTI.

14E. Reprography

ON EQUATION FOR CHARACTERISTIC CURVES OF A SPECTROPHOTOMETRIC EMULSION,
Aerospace Research Labs Wright-Patterson AFB Ohio
Thomas K. Krueger. Jun 67, 12p Rept no. ARL-67-0125

Descriptors: (*Spectroscopy, *Photographic emulsions), Line spectrum, Intensity, Equations, Vector analysis.

An equation for the characteristic curves of photographic plates used in astronomical work is presented along with the procedure used to fit the experimental data to the equation. Its accuracy in calculating line intensities is discussed. (Author)
AD-658 457 HC$3.00 MF$0.65

SIMPLIFICATION OF HOLOGRAPHIC PROCEDURES,
Naval Training Device Center Port Washington N Y
Joseph T. Carcel, Alfred H. Rodemann, Edward Florman, and S. Domeshek. 10 Jan 66, 3p
Availability: Published in Applied Optics v5 n7 p1199-1201 Jul 1966.

Descriptors: (*Photographic techniques, *Lasers), Diffraction, Interferometers, Stability, Temperature, Resolution, Vibration, Turbulence, Optical equipment, Photographic plates.
Identifiers: Holography.

The present state of the holographic art has set many stringent parameters on the production of holograms, such as extreme mechanical, temperature, and air stability for long periods of time, and slow film emulsions with extremely high resolution. The Physical Sciences Laboratory of the U.S. Naval Training Device Center has investigated, experimented, and produced many clear high resolution holograms in a ground-level Butler Building without close temperature controls and using other than expensive, massive, and extremely rigid optical mounts and equipment. (Author)
AD-658 522 Not available from CFSTI.

PROBABILITY INDEXES OF IMAGE INTERPRETER PERFORMANCE: DEVELOPMENT AND EVALUATION.
Technical rept.,
North American Aviation Inc Columbus Ohio Columbus Div
Girard W. Levy, Leonard A. Evans, John M. Humes, and Robert Sadacca. Jun 67, 88p
BESRL-TRN-183
Contract DA-49-092-ARO-47

Descriptors: (*Photointerpretation, Accuracy), (*Photointerpreters, Performance (Human)), Man-machine systems, Probability, Photographic images, Targets, Identification, Target discrimination, Classification, Statistical analysis, Predictions, Feedback.

The study was conducted in a two-phase project to explore the development of indexes predictive of interpretation results and the effect on performance of probabilistic feedback given interpreters while they are examining imagery. Statistical treatment and analysis of data, based on the judgment and performance of trained interpreters, is described in detail. The ten best predictors of accuracy of target identification and the eight best predictors of the value of continued search (search utility) were identified and their predictive validity assessed in a three-session experiment. The predictors contributing most to the validity for accuracy of performance were (1) judged target difficulty and (2) interpreter's confidence in his identifications. Predictors of search utility were of generally low validity. More effective prediction was obtained for target identification than for target detection or classification. It was found that feedback of both accuracy and search utility probability data reduced the number of incorrect identifications. Overall individual accuracy, completeness, or rate of interpretation was not affected, however, by feedback. Based on the findings in this study, it seems feasible that interpreters' accuracy predictions can be substituted for confidence ratings now used as more precise indications of dependability of the information. Predictions have some utility also in weighting indentifications made by several interpreters or in conjunction with relative estimated cost errors--omissions vs misidentifications--in selecting among response alternatives within an image interpretation facility. (Author)
AD-658 653 HC$3.00 MF$0.65

LIGHT SCATTERING IN THE SEA,
Lamont Geological Observatory Palisades N Y
For primary bibliographic entry see Field 20F.
AD-658 702 Not available from CFSTI.

DETERMINATION OF THE DISTORTION AND THE FOCAL LENGTH FOR THE OBJECTIVE-LENS OF THE CAMERA NAFA-3c/25 AND A CAMERA WITH A MOVING FILM,
Foreign Technology Div Wright-Patterson AFB Ohio
A. G. Kirichenko, and A. A. Sychev. 28 Feb 67, 11p Rept no. FTD-HT-67-86
TT-67-62937
Opredelenie Distorsii i Fokusnogo Rasstoyaniya Obbektivov Nafa 3C/25 i Kameri s Podvikhnoi Plenkoi, trans. of Byulleten' Stantsii Opticheskogo Nablyudeniya Iskusstvennykh Sputnikov Zemli (USSR) n38 p6-8 1964.

Descriptors: (*Satellites (artificial), *Motion picture cameras), (*Distortion, Camera lenses), Photographic equipment, Stars, Photographs, Astronomy, USSR.

A study of the distortion of camera objectives was made to determine the suitability of photographs taken with the KPP and NAFA-3c/25 cameras for precise astrometric work. The stars used in the determination of distortion were at distances of 8-11 degrees from the optical center for the NAFA-3c/25 camera and 5-15 degrees from the optical center of the KPP camera. Mean distance between reference stars was 3-5 degrees. Much of the description of the method of analyzing the data presumes that the reader has a knowledge of the Kiselev method described in the above-cited reference. Difficulties are involved in the study because with the NAFA-3c camera it is possible to obtain a photograph with a satellite trail not far from the optical center, but this cannot be done with the KPP camera; in the latter case the points to be measured are always at some distance from the optical center or even at the margin of the frame. Coordinates were computed on a 'Ural-2' computer. Data are given on objective distortion and the dependence of the distortion coefficient on distance of the object from the center of the photograph. Information is also presented on the dependence of the distortion coefficient on azimuth for the two cameras. An important discovery was that the distortion is asymmetrical relative to the optical center. Focal length was determined from a zenith photograph of stars with a good point image; star pairs were selected so that the straight line passing through the pair intersected the center of the photograph.
AD-658 767 HC$3.00 MF$0.65

OPTICAL IMAGERS FOR THE SMALL EARTH RESOURCES SATELLITE.
IIT Research Inst., Chicago, Ill. Astro Sciences Center.
For primary bibliographic entry see Field 20F.
For abstract, see STAR 05 21.
N67-36064 HC$3.00 MF$0.65

DEVELOPMENT OF COMPUTER AIDS FOR TAPE-CONTROL OF PHOTOCOMPOSING MACHINES. REPORT NO. 2. EXTENSION OF THE SYSTEM OF PREPARING A COMPUTER-PROCESSED TAPE TO INCLUDE THE SETTING OF MULTIPLE LINE EQUATIONS.
American Mathematical Society, Providence, R. I.
Jul 67, 49p
Grant NSF-GN-533

Descriptors: (*Data processing systems, Mathematics), (*Input-output devices, Coding), (*Programming (Computers), *Equations), (*Electrooptical photography, Control systems), Programming languages, Coding, Symbols, Theorems, Magnetic tape, Automation.
Identifiers: Photocomposition, Stil.

Contents: Programming approach: Translators, Preprocessor, The typesetter; Input languages: Existing languages: The standard typesetting input language (STIL); Languages tested as keyboard input languages; Tests of input languages; Alternative methods of composition; Additional work to be done.
PB-175 939 HC$3.00 MF$0.65

15. MILITARY SCIENCES

15B. Chemical, Biological, and Radiological Warfare

CBE FACTORS: MONTHLY SURVEY NO. 17.
ATD work assignment no. 50.
Library of Congress Washington D C Aerospace Technology Div
1967, 306p Rept no. ATD-67-50
TT-67-62907
Survey series on Chemical, Biological, and Environmental Factors. See also AD-654 324.

Descriptors: (*Chemical warfare agents, Reviews), (*Biological warfare agents, Reviews), (*Environment, Reviews), Pesticides, Herbicides, Fertilizers, Hallucinogens, Bacteria, Viruses, Epidemiology, Aerosols, Ecology, Micrometeorology, Soils, USSR, Eastern Europe, China.

The report covers the following areas: Chemical factors: Pesticides; Herbicides; Fertilizers; Psychotomimetics; Other chemicals; Biological factors: Pathogens; Environmental factors: Aerosols; Ecology; Micrometeorology; Soil science.
AD-658 438 HC$3.00 MF$0.65

RESEARCH ACTIVITIES OF THE COMMISSION ON EPIDEMIOLOGICAL SURVEY, AFEB,
Army Medical Unit Frederick Md
Dan Crozier, and Theodore E. Woodward. 1967.
Presented at the Association of Military Surgeons of the United States, Washington, 9 Nov 1966.
Availability: Published in Military Medicine v132 n8 p609-13 Aug 1967.

Descriptors: (*Epidemiology, Reviews), (*Biological warfare, Epidemiology), Scientific organizations, Armed forces research, Etiology, Metabolism, Therapy, Vaccines, Diagnosis.

A review is given research activities of the Armed Forces Epidemiological Board's Commission on Epidemiological Survey in the areas of (1) pathogenesis of infectious diseases of importances in the medical defense against biological weapons; (2) prophylaxis and treatment of such diseases; and (3) methods for the early recognition of infection in an exposed population and rapid identification of specific organisms.
AD-658 800 Not available from CFSTI.

15C. Defense

SOME COMMENTS ON SYSTEMS ANALYSIS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-658 426 HC$3.00 MF$0.65

PARALLEL AND SEQUENTIAL STRATEGIES FOR R AND D PROJECTS.
Harvard Univ Cambridge Mass Graduate School of Business Administration
For primary bibliographic entry see Field 5A.
AD-658 544 Not available from CFSTI.

A PARAMETRIC APPROACH TO THE EVALUATION OF MILITARY INFORMATION SYSTEMS,
Bunker-Ramo Corp Mclean Va
For primary bibliographic entry see Field 15G.
AD-658 737 HC$3.00 MF$0.65

POSTATTACK RECOVERY MANAGEMENT: CONCEPTS AND TECHNIQUES FOR MODEL DEVELOPMENT,
Stanford Research Inst Menlo Park Calif
Donald E. Clark, Jr., and Carl F. Miller. Mar 67, 101p
Contract OCD-PS-66-11

Descriptors: (*Civil defense systems, *Countermeasures), (*Nuclear warfare, Recovery), Management engineering, Decision making, Models (Simulations), Radioactive fallout, Survival, Nuclear weapons, Vulnerability, Food, Water supplies, Inventory, Economics.

A postattack recovery model system is described under the four general categories of weapon effects and vulnerability, economic systems, countermeasures, and civil defense organization. Specific models in each category are listed, discussed briefly in terms of inputs, internal computational parameters, and outputs. References are given that describe the current state of development for each model. A general approach to model design and development is given, including water and bread systems as detailed examples. The application of models to develop a civil defense organization to manage postattack recovery operations is described.
AD-658 744 HC$3.00 MF$0.65

SHELTER MANAGEMENT TEXTBOOK.
Office of Civil Defense Washington D C
Jul 67, 121p Rept no. SM-161

Descriptors: (*Fallout shelters, *Management engineering), (*Civil defense systems, Training), Textbooks, Radiobiology, Weapons, Sociology, Population, Atmosphere, Temperature control, Water, Safety, Food, Sleep, Sanitary engineering, Medicine, Illumination, Power, Communication systems, Training, Psychology, Religion, Recreation.

Contents: Overview of shelter management; Radiological protection; Other weapon effects; Preoccupancy management responsibilities; Organizing the shelter population; Organizing shelter resources; Organizing activities and patterns of living; Atmosphere and temperature control; Water; Safety; Food; Sleep; Sanitation; Medical care; Illumination and power; Communication; Training; Psychological support; Religious, recreational, and service activities; Post-occupancy management responsibilities.
AD-658 898 HC$3.00 MF$0.65

WORK OF THE ARMED FORCES IN THE ECONOMIC AND SOCIAL DEVELOPMENT OF THE COUNTRIES (MILITARY CIVIC ACTION).
Inter-American Defense Board Washington D C
For primary bibliographic entry see Field 5D.
AD-659 037 HC$3.00 MF$0.65

15D. Intelligence

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 9B.
AD-658 439 HC$3.00 MF$0.65

15E. Logistics

PLANET: PART I. AVAILABILITY AND BASE CADRE SIMULATOR,
Rand Corp Santa Monica Calif
Bernard J. Voosen, and David Goldman. Apr 67, 214p Rept no. RM-4659-PR
Contract F44620-67-C-0045

Descriptors: (*Logistics, Weapon systems), (*Simulators, Maintenance), Computers, Computer programs, Instruction manuals, Aircraft, Simulation.

The computer routines, operating manual, and programmer's manual are given for the Availability and Base Cadre (ABC) Simulator, one of the four simulation programs that make up the Planned Logistics Analysis and Evaluation Technique (PLANET). The ABC Simulator is intended to simulate the organizational maintenance activities in a single or multibase environment. The model can be used to simulate missiles or aircraft (in some cases, both). Its structure is very flexible and allows study of a broad range of problems, such as the impact of increased workloads, changes in hardware design and/or operational requirements, manning, and maintenance systems. Nearly every facet of maintenance and other logistics activities is incorporated in the model, including variable personnel staffing by type, base, and shift; travel times with delays and equipment failures; part failure modes and failure levels; maintenance repair time distributions, etc. Although PLANET is programmed in SIMSCRIPT, the user need not be an experienced SIMSCRIPT programmer to conduct a simulation. The step-by-step instructions given in the programmer's manual will enable the user to assemble his data in a form acceptable to the model. The ABC simulator has the capability to rerun a simulation from any point, without repeating the previous execution. (Author)
AD-658 431 HC$3.00 MF$0.65

SURVEY OF FOOT MEASUREMENTS AND THE PROPER FIT OF ARMY SHOES. ANALYSIS OF CHARACTERISTICS OF FOOTGEAR FOR ARMY FIELD USE.
Rept. no. 4,
Army Medical Research Lab Fort Knox Ky
Arthur Freedman. 11 Mar 46, 8p

Descriptors: (*Shoes, Design), Army personnel, Feet, Measurement, Anthropometry, Acceptability.

The principles which are fundamental to the design of Army field boots are presented and discussed. An experimental boot design believed to possess the most suitable features for Army field use under a wide variety of terrain and climatic conditions is proposed. (Author)
AD-658 556 HC$3.00 MF$0.65

PACK, FIELD, CARGO; PACK, FIELD, COMBAT; AND SUSPENDERS, PACK, FIELD, CARGO AND COMBAT.
Letter rept.,
Army Medical Research Lab Fort Knox Ky
Arthur Freedman. 29 Aug 44, 3p

Descriptors: (*Packs (Containers), Weight), Army personnel, Fatigue (Physiology), Design.

The purpose of the research was to determine the physiologic effects of packs, field, cargo; packs, field, combat; and suspenders, pack, field, cargo and combat, upon the men wearing them.
AD-658 557 HC$3.00 MF$0.65

TEST OF SUSPENDERS, PACK, FIELD, CARGO AND COMBAT, (SUPPORT OF THE PACK, FIELD, M-1944, BY MEANS OF SUSPENDERS WHICH INCORPORATE A STRAP TRAVERSING THE CHEST,
Army Medical Research Lab Fort Knox Ky
Arthur Freedman, and Charles Kirkpatrick. 11 Apr 45, 21p

Descriptors: (*Packs (Containers), Design), Acceptability, Army personnel, Respiration, Thorax, Supports, Tolerances (Physiology).

A Modified Suspender for the pack, field, cargo, and combat, M-1944 was designed. Its novel characteristics are: (1) inclusion of a strap crossing the chest; (2) provision of a means for rapid removal of the pack; (3) simplicity of both general design and of adjustment for size; and (4) independent suspension of the cartridge belt. Both field and laboratory tests demonstrated that the chest strap improves the carry of the pack, does not interfere with respiration, and aids in the elimination of axillary compression by the suspenders. (Author)
AD-658 558 HC$3.00 MF$0.65

TEST OF HARNESS, MAN, M-1944, TYPE 1.
Army Medical Research Lab Fort Knox Ky
6 Mar 45, 17p

Descriptors: (*Packs (Containers), Supports), Tolerances (Physiology), Thorax, Respiration, Army personnel, Pain.

The Harness, Apron Type, Double Trace, Type 1 does not interfere significantly with breathing, whereas Harness, Man, M-1944, Type 1 may do so. The Tump Line Harness is unsatisfactory for

men untrained in its use. Harness traces should be more than 5 feet in length. Pain is produced by harness shoulder straps. (Author)
AD-658 559 HC$3.00 MF$0.65

STUDY OF HEAD PROTECTION FOR TANK CREWS, FIRST PARTIAL REPORT.
Army Medical Research Lab Fort Knox Ky
13 Jun 45, 8p

Descriptors: (*Helmets, Design), Head, Protection, Tanks (Combat vehicles), Army personnel.

The Quartermaster tank helmet is considered satisfactory for crash protection provided the chin strap support is moved from the outside to the inside of the helmet. The M1 steel helmet may be worn with the Quartermaster tank helmet by personnel outside the tank or when traveling with hatches open but is not satisfactory for use inside the tank. Where armor protection inside the tank is required, a modified steel helmet to fit over the Quartermaster helmet or a unit steel helmet with suspension equal to the Quartermaster helmet is required.
AD-658 560 HC$3.00 MF$0.65

SURVEY OF FOOT MEASUREMENTS AND THE PROPER FIT OF ARMY SHOES. STUDY OF FACTORS BEARING ON THE ESTABLISHMENT OF SIZE TARIFFS, ON SIZE DESIGNATIONS, AND ON SHOE FITTING.
Rept. no. 1,
Army Medical Research Lab Fort Knox Ky
Arthur Freedman, Charles M. Kirkpatrick, and Everett C. Huntington. 4 Dec 45, 18p

Descriptors: (*Shoes, Army personnel), Acceptability, Anthropometry, Feet, Measurement, Socks, Selection.

The purpose of the research was to define by field study and quantitative measurement: (1) The relationship of shoe size to the incidence and type of foot casualties; (2) The influence of marching and weight bearing on foot size; (3) The role of socks in determining shoe size; and (4) The importance of the wearer's judgment of fit on the selection of shoes. (Author)
AD-658 562 HC$3.00 MF$0.65

SURVEY OF FOOT MEASUREMENTS AND THE PROPER FIT OF ARMY SHOES; STUDY OF SWEATING OF THE FEET OF MARCHING TROOPS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6P.
AD-658 563 HC$3.00 MF$0.65

LETTER REPORT ON TEST OF SOCKS, CUSHION SOLE, EXPERIMENTAL,
Army Medical Research Lab Fort Knox Ky
Arthur Freedman. 28 Jul 44, 2p

Descriptors: (*Socks, Acceptability), Laundering, Woolen textiles, Skin, Diseases, Feet, Perspiration, Tests, Army personnel.

An erthematous reaction was noted in approximately 15% of a small group of men who wore the test socks. Their skin reactions were not of a serious nature and seemed to be healing despite continued wear of the socks. However, since one subject may have had the rash prior to the test, it is not possible with certainty to incriminate the subject items.
AD-658 628 HC$3.00 MF$0.65

A SUGGESTED PROCEDURE FOR THE SELECTION AND DESCRIPTION OF REFERENCE TEST AREAS,
Army Engineer Waterways Experiment Station Vicksburg Miss
For primary bibliographic entry see Field 13F.
AD-658 659 HC$3.00 MF$0.65

FOOT MEASUREMENTS OF PROPER FIT OF ARMY SHOES,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6P.
AD-658 682 HC$3.00 MF$0.65

SOME LINEAR PROGRAMMING APPLICATIONS TO STOCKAGE PROBLEMS,
Rand Corp Santa Monica Calif
Robin B. S. Brooks. Sep 67, 49p Rept no. RM-5422-PR
Contract F44620-67-C-0045

Descriptors: (*Inventory control, Air force equipment), (*Linear programming, Inventory control), (*Maintenance, Inventory control), Algorithms, Optimization, Decision making, Approximation (Mathematics), Cost effectiveness, Simplex method, Operations research, Management planning.

The report discusses the use of linear programming algorithms for solving Air Force stockage problems. Instead of attempting exact solutions to the problems considered in the study, a procedure is suggested that will provide approximate solutions. It is 'fail safe' in the sense that if the policies computed are good approximations to one another, then any of them provides a good approximation to the solution. Since the number of decision variables is large compared with the number of policy characteristics, the standard simplex method is impractical because of the large number of vectors to be enumerated. It is more feasible to solve by the simplex method using multipliers.
AD-658 823 HC$3.00 MF$0.65

AMMI PONTOON FIELD ASSEMBLY PROCEDURES.
Naval Civil Engineering Lab Port Hueneme Calif
For primary bibliographic entry see Field 13J.
AD-658 883 HC$3.00 MF$0.65

LONG TERM STORAGE EXPERIMENTAL PROGRAM - ANNUAL TEARDOWN INSPECTION, ERIE ORDNANCE DEPOT, 20 JUNE TO 1 JULY 1949.
Memorandum rept.,
Frankford Arsenal Philadelphia Pa Pitman-Dunn Research Labs
W. J. Shields. 1949, 46p
FA-MR-428

Descriptors: (*Containers, Storage), (*Ordnance, *Storage), Effectiveness, Aging (Materials), Steel, Hermetic seals, Degradation, Controlled atmospheres.

Eight unit containers stored outdoors at Erie Ordnance Depot for approximately three and a half years were opened, and the ordnance materiel stored in them was inspected. All containers had maintained satisfactory protective atmospheres, as evidenced by the good condition of the stored equipment. Some mechanical difficulties were observed, but these were not attributable to failures of either the storage methods or the containers. Deterioration of the materiel stored in these containers was no greater than that observed in an inspection conducted about two years ago. (Author)
AD-658 984 HC$3.00 MF$0.65

15G. Operations, Strategy, and Tactics

SOME IMPLICATIONS OF NEW COMMUNICATIONS TECHNOLOGIES FOR NATIONAL SECURITY IN THE 1970s,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 17B.
AD-658 424 HC$3.00 MF$0.65

ARTILLERY GLOSSARY. ENGLISH-VIETNAMESE, VIETNAMESE-ENGLISH. FIRST EDITION (Tu Dien Phao Binh. Anh-Viet, Viet-Anh. Xuat Ban Lan Thu Nhat).
Military Assistance Command Vietnam San Francisco Calif 96222 Training Aids Div
For primary bibliographic entry see Field 5B.
AD-658 665 HC$3.00 MF$0.65

A PARAMETRIC APPROACH TO THE EVALUATION OF MILITARY INFORMATION SYSTEMS,
Bunker-Ramo Corp Mclean Va
J. C. Grimberg. 30 Jun 66, 34p
ADFSC-06-07-01
Contract DA-36-039-AMC-00954 (Y)

Descriptors: (*Armed forces operations, Cost effectiveness), (*Combat information centers, Effectiveness), Display systems, Factor analysis, Reliability, Decision making.
Identifiers: Military information systems, Evaluation.

The report documents the first part of a research study about a parametric approach to military information systems evaluation by cost-effectiveness analysis. In this approach, the effectiveness of such an information system is measured by its impact on the effectiveness of the military operation using it. Five significant parameters through which an information system affects the effectiveness of military operations are defined parametrically. The report is the first of three and covers the general approach and two of the significant parameters in detail. In performing the work it was found necessary to define five significant parameters, viz, promptness, dependability, brevity, perspicuity, and discriminance in order to make them unambiguous and measurable. They roughly substitute for the more commonly discussed characteristics of timeliness, accuracy and completeness to which sometimes is added relevance, which were not found as manageable to this type of treatment. (Author)
AD-658 737 HC$3.00 MF$0.65

SOVIET MILITARY POLICY AT THE FIFTY-YEAR MARK,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5D.
AD-658 813 HC$3.00 MF$0.65

AIR-TO-AIR COMBAT IN WORLD WAR II: A QUANTITATIVE HISTORY.
Research paper,
Institute for Defense Analyses Arlington Va Economic and Political Studies Div
Joseph H. Reinburg. Nov 66, 54p Rept no. RP-P-345
IDA/HQ-67-6244
Contract SD-50

Descriptors: (*Tactical warfare, *History), (*Air force operations, Tactical warfare), Aircraft, Performance (Engineering), Warfare, Air drop operations, Transports, Attack bombers, Europe, North Korea, South Korea, Pacific Ocean Islands.

This Paper is a brief impressionistic survey of tactical air warfare (particularly air-to-air combat) from its primitive beginnings in the First World War through the one-sided air operations over Korea. In part the essay is a narrative, but a principal goal is to assemble data on air losses from scattered sources. To better understand how certain kinds of aircraft have performed against others in the past, this study stresses sortie-loss ratios for both the allied and enemy air forces. Thus, it is an essay in historical perspective whose purpose is to supply useful information for estimating attri-

tion parameters in a cost-effectiveness study on allocation of tactical air. While the past cannot serve as a precise guide to the future, it serves as a minimum prerequisite for a parametric study of air losses in some future conflict. (Author)
AD-659 043 HC$3.00 MF$0.65

16. MISSILE TECHNOLOGY

16A. Missile Launching and Ground Support

EFFECT OF POINT ARGUELLO WIND VARIABILITY UPON RANGE SAFETY CONSIDERATIONS AT WTR.
Rept. for Dec 65-Jul 66,
Aerospace Corp El Segundo Calif El Segundo Technical Operations
Richard G. Stern. Aug 67, 33p Rept no. TR-0158 (3301)-1
SAMSO-TR-67-8
Contract F04695-67-C-0158

Descriptors: (*Guided missile ranges, Wind), (*Wind, *Guided missile safety), Impact prediction, Guided missile trajectories.

The effect of wind variability at Western Test Range (WTR) upon a launch vehicle's instantaneous impact point (IIP) is determined in this report. It is shown that winds may cause the instantaneous impact points of a properly functioning booster to cross over the destruct line and hence be destroyed. An evaluation of preflight wind conditions is necessary when the launch azimuths are such that the nominal trajectory lies in close proximity to the destruct line. To estimate the wind induced variations in IIP or debris impact points occurring between the times a preflight wind sounding is made and launch occurs, 6-hr wind variability statistics were compiled for Point Arguello. A linear technique for determining the variability in IIP or debris impact points from the statistics was utilized for a typical launch vehicle. The wind induced standard deviation in IIP or debris impact points over a 6-hr period was found to be from one-third to one-half of the standard deviation for the monthly variation. The standard deviations of component 6-hr wind differences at a given altitude were found generally to be about one-half that of the monthly component wind standard deviations. (Author)
AD-658 847 HC$3.00 MF$0.65

17. NAVIGATION, DETECTION, COMMUNICATIONS, AND COUNTERMEASURES

17A. Acoustic Detection

THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD PROCESSING. VOLUME I,
Cook Electric Co Morton Grove Ill
For primary bibliographic entry see Field 9D.
AD-658 613 Not available from CFSTI.

THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD PROCESSING. VOLUME II,
Cook Electric Co Morton Grove Ill
For primary bibliographic entry see Field 9D.
AD-658 614 Not available from CFSTI.

THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD PROCESSING. VOLUME III,
Cook Electric Co Morton Grove Ill
For primary bibliographic entry see Field 9D.
AD-658 615 Not available from CFSTI.

OBSERVATIONS OF THE SOUND FIELD IN THE DEEP SEA,
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 20A.
AD-658 718 HC$3.00 MF$0.65

ESTIMATION OF SONAR TARGET PARAMETERS.
Doctoral thesis,
Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
James Ulysess Kincaid, and George R. Cooper.
Aug 67, 119p TR-EE-67-6
Grant NSF-GK-189
Research supported in part by NASA and Texas Instruments Inc., Dallas.

Descriptors: (*Sonar targets, Mathematical models), Attenuation, Velocity, Reflectors, Sonar signals, Reflection, Computers, Signal-to-noise ratio, Reflectivity, Sonar equipment.

The research is concerned with the estimation of parameters associated with targets which are characterized by a collection of range-distributed point reflectors. Each reflector is characterized by three parameters, one associated with reflectivity, one with velocity, and the other is related to range. A mathematical model is presented for the signal transmission channel, which is described as a multipath structure. The proposed technique for obtaining the product estimates requires the solution of a system of simultaneous linear equations whose dimensionality is usually larger than can be handled using standard computer routines. The proposed signal processing and parameter estimation techniques are not dependent upon any particular statistical restriction. Computer simulation studies to determine the accuracy in terms of variance and bias and the limit of feasible performance in terms of signal-to-noise ratio, are considered for the case where the additive noise is Gaussian with zero mean. (Author)
PB-176 087 HC$3.00 MF$0.65

17B. Communications

SOME IMPLICATIONS OF NEW COMMUNICATIONS TECHNOLOGIES FOR NATIONAL SECURITY IN THE 1970s,
Rand Corp Santa Monica Calif
Leland L. Johnson. Sep 67, 25p Rept no. P-3639
Prepared for presentation at Conf. on 'The Implications of Military Technology in the 1970s', Sponsored by the Institute for Strategic Studies, Elsinore, Denmark, September 28-October 1, 1967.

Descriptors: (*Military strategy, Communication systems), (*Television communication systems, Education), Command + control systems, Decision making, Facsimile communication systems, Underwater communication systems, Global communication systems, Electronic countermeasures, Costs, Economics, Satellites (Artificial).

In view of the extraordinarily rapid technological advances taking place, and the numerous promising applications, questions immediately arise about the implications for national security. The potential contribution of satellite technology to the problem of adequate communication in time of international crisis, and its use for command and control in wartime are two specific areas of concern. In addition, a discussion is presented of some broader implications relating to open and closed societies, the centralization and decentralization of decision-making functions, the process of bargaining and negotiation, the viability of alliances during crisis and war, and the long-run structuring and restructuring of national interests and alliances.
AD-658 424 HC$3.00 MF$0.65

PERFORMANCE EVALUATION OF TELETYPE ERROR CONTROL EQUIPMENT ON AN ETR CIRCUIT,
Mitre Corp Bedford Mass
Frederick N. Nelson, Jr. Sep 67, 24p Rept no. MTR-366
ESD-TR-67-121
Contract AF 19 (628)-5165

Descriptors: (*Teletype systems, Errors), (*Teletype systems, Performance (Engineering)), Radio teletype systems, High frequency, Data transmission systems, Control systems, Corrections.

The report describes a series of teletype transmission tests made over an HF radio link between Mahe Island and Cape Kennedy, Florida. Two methods of error control protection were employed and their relative performances evaluated. (Author)
AD-658 435 HC$3.00 MF$0.65

OPERATIONAL SPECIFICATION FOR EXERCISE AND EVALUATION CAPABILITY,
Mitre Corp Bedford Mass
For primary bibliographic entry see Field 9B.
AD-658 436 HC$3.00 MF$0.65

ERROR PERFORMANCE OF DIFFERENTIAL PHASE SHIFT TRANSMISSION OVER A TELEPHONE LINE.
Technical rept.,
Mitre Corp Bedford Mass
J. J. Bussgang, and M. Leiter. Aug 67, 38p Rept no. MTP-66
ESD-TR-67-393
Contract AF 19 (628)-5165

Descriptors: (*Data transmission systems, Phase shift), (*Telephone lines, Data transmission systems), Errors, Modulation, Information theory, Probability, Interference.

The paper considers differential phase-shift transmission over a band-limited channel with specified phase and amplitude characteristics. The problem treated is the prediction of feasible data rates and corresponding error rates over such channels. An expression is given for the probability of error. This expression takes into account intersymbol and interchannel interference when differential phase-shift keying modulation is used. A distortion index which is a measure of phase error is defined, and the concept of phase opening which parallels the concept of eye opening commonly employed in the amplitude-shift keying modulation is introduced. This analysis examines effects of various parameters on the performance of a high data rate transmission system over a telephone line. Results indicate that for a carefully equalized line a single tone system should be used, and that higher order phase alphabets are to be preferred as the bit increases. (Author)
AD-658 437 HC$3.00 MF$0.65

COST/BENEFIT ANALYSIS OF TELEVISED RADAR FOR GENERAL AVIATION.
Federal Aviation Administration Washington D C Systems Research and Development Service
For primary bibliographic entry see Field 1B.
AD-658 514 HC$3.00 MF$0.65

SYLLABLE CODER COMMUNICATION SYSTEM.
Final rept. 1 Jun 66-31 May 67,
RCA Labs Princeton N J
E. S. Rogers, W. H. Jamison, and P. W. Ross. 31 May 67, 199p
Contract DCA100-66-C-0092

Descriptors: (*Voice communication systems, Narrowband), (*Speech recognition, Communica-

tion equipment), (*Coding, *Speech), Analysis, Data storage systems, Logic circuits, Data processing systems, Computer programs.

Describes research done to increase the resolving power of a 200 Speech Element Communication System. This system, whose primary purpose is to save channel capacity normally required for voice transmission, reduces the necessary channel capacity approximately 1000:1. This efficient use of a communication channel is achieved by automatically encoding of the speech signal by machine. The research covered the following subjects: Improve recognition of initial voiced consonants; Improve voiced-unvoiced sound detection; Improve intrasyllabic pause detection; Investigate fine structure speech features; Use fine structure analysis to improve recognition of final /th/ and /f/ and initial /t/ and /k/. The report includes a description of several special analyzers built to effect the desired improvement. The improved analyzer has been evaluated with 19,200 voicings of 960 syllables using 14 speakers. The results indicate that 560 syllables can be recognized with 75 percent accuracy for several speakers. (Author)
AD-658 530 HC$3.00 MF$0.65

SIGNAL GLOSSARY, ENGLISH-VIETNAMESE, VIETNAMESE-ENGLISH. FIRST EDITION (Tu Dien Truyen Tin. Anh-Viet, Viet-Anh. Xuat Ban Lan Thu Nhat.).
Military Assistance Command Vietnam San Francisco Calif 96222 Training Aids Div
For primary bibliographic entry see Field 5B.
AD-658 663 HC$3.00 MF$0.65

DEVELOPMENT OF EAR PROTECTOR, ELECTROACOUSTIC, MX-7307 ()/UIC.
CBS Labs Stamford Conn
For primary bibliographic entry see Field 6Q.
AD-658 681 HC$3.00 MF$0.65

RADIO SCIENCE.
Special repts. no. 66,
Air Force Cambridge Research Labs L G Hanscom Field Mass
Jules Aarons. Jun 67, 116p Rept no. AFCRL-67-0400
Availability: Published in Special Issue of Radio Science v1 n10 p1125-1236 Oct 1966.

Descriptors: (*Radio transmission, Reports), (*Ionosphere, Electron density, Attenuation, Ionospheric propagation, Scintillation, Absorption, Troposphere, Magneto-optic effect, Measurement, High frequency, Experimental design.

The special issue of Radio Science contains a series of papers on radio wave propagation through the earth's atmosphere and within the ionosphere. The papers were given at the Second Symposium on Radio Astronomical and Satellite Studies of the Atmosphere which was held in Boston, Massachusetts and sponsored by the Air Force Cambridge Research Laboratories. The subject groupings are total electron content, scintillation, ionospheric absorption, tropospheric absorption and high frequency propagation. (Author)
AD-658 751 Not available from CFSTI.

ANALOG SOURCE DIGITIZATION: A COMPARISON OF THEORY AND PRACTICE.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 9D.
AD-658 776 Not available from CFSTI.

A CODING THEOREM FOR A CLASS OF UNKNOWN CHANNELS.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 9D.
AD-658 778 Not available from CFSTI.

COMMUNICATIONS OR TRANSPORT: DECISION-MAKING IN DEVELOPING COUNTRIES,
Massachusetts Inst of Tech Cambridge Center for International Studies
Paul S. Shapiro. Aug 67, 236p Rept no. C/67-8
Contract AF 49 (638)-1237. ARPA Order-427

Descriptors: (*Communication systems, *Management planning), (*Transportation, *Decision making), Economics, Political science, Foreign aid, Costs, Roads, Construction, Telephone communication systems, Radio communication systems, Attitudes.

Comparison is made of the uses of investment in transport and in communications for developing countries. A method for investment decision-making is proposed, and relevant data are presented and analyzed. It is hypothesized that in achieving development goals transport and communications may be substitutable or at least complementary. National investment strategies are seen to depend on Communist or non-Communist ideology, on theories of economic planning, on situational conditions, and on methods of analysis. The construction of rural roads is posited as the major transport investment for developing countries in the future. It is suggested that increased rationality in decision-making in the transport and communications sector is possible through the application of cost-benefit analysis at the village level. This is seen to require the collection of cost and descriptive data for a range of communications media and for various types of roads, as well as increased knowledge of the benefits they afford. A model is proposed for the staging of investment.
AD-658 816 HC$3.00 MF$0.65

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5A.
AD-658 834 HC$3.00 MF$0.65

LABORATORY SIMULATION OF REENTRY PLASMA SHEATHS.
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 20I.
AD-658 882 HC$3.00 MF$0.65

MEASUREMENT OF MULTIPATH EFFECTS IN A SATELLITE-AIRCRAFT UHF LINK,
Massachusetts Inst of Tech Lexington Lincoln Lab
Kenneth L. Jordan, Jr. 10 Mar 67, 3p Rept no. JA-2951
ESD-TR-67-489
Contract AF 19(628)-5167
Availability: Published in Proceedings of the IEEE v55 n6 p1117-8 Jun 1967.

Descriptors: (*Communication satellites (Active), *Multipath transmission), Antennas, Reflection, Electromagnetic waves, Ultrahigh frequency, Aircraft, Measurement.

Preliminary results are presented which were obtained during a measurement program designed to investigate multipath effects in the propagation path at UHF frequencies from a synchronous satellite to an aircraft. Specular reflection was observed over both land and sea for grazing angles up to about 15 degrees. (Author)
AD-658 917 Not available from CFSTI.

CYBERNETICS AND SPEECH COMMUNICATIONS: A SURVEY OF RUSSIAN LITERATURE.
Technical rept.,
Air Force Avionics Lab Wright-Patterson AFB Ohio
James W. Falter, and Klaus W. Otten. 14 Nov 66, 11p Rept no. AFAL-TR-67-247
Availability: Published in IEEE Transactions on Audio and Electroacoustics vAU-15 n1 p27-36 Mar 1967.

Descriptors: (*Speech, *Communication systems), (*Cybernetics, Speech), USSR, Reviews, Speech compression, Speech recognition, Speech representation, Analysis, Intelligibility.

A critical survey of Russian publications in those fields of cybernetics that apply to speech communication is presented. In particular, reports on speech analysis, production, and perception, speech bandwidth compression, and automatic speech recognition are reviewed to indicate trends rather than technical details. The paper is supplemented with bibliographic appendixes which include references to applicable books and papers as well as information on their translation availability. (Author)
AD-658 943 Not available from CFSTI.

CONDUCTION CURRENT SIGNALING THROUGH SEA WATER AND WET SAND.
Research and development technical rept.,
Army Electronics Command Fort Monmouth N J
Edgar A. Conover. Jun 67, 33p Rept no. ECOM-2855

Descriptors: (*Communication systems, Electric currents), Sea water, Sand, Inverters, Ultralow frequency, Low frequency, Signals, Electrodes, Underwater, Circuits, Detection.

A communication system employing conduction currents through coastal waters and wet sand is described. Design details of the high efficiency battery-operated inverters used as signal sources for the experiments are given. The detection circuits used to receive underwater electrical current signals through high levels of interference are also shown. Results of tests conducted at Sandy Hook, N. J. indicated that it is possible to communicate over distances of 200-700 meters using powers of 120-300 watts. The method of communication described is not new, but the utilization of very efficient DC-AC solid-state inverters as signal sources makes earth current systems operationally attractive. Although the communication ranges are short compared to high frequency radio communications, earth current communications may prove useful for certain applications. (Author)
AD-658 966 HC$3.00 MF$0.65

STATISTICAL COMMUNICATION THEORY FINAL REPORT, 1 DEC. 1963 - 31 MAR. 1967.
Northeastern Univ., Boston, Mass. Communication Theory Group.
Apr 67, 95p NASA-CR-87998, AFCRL-67-0272
Contracts NGR-22-011-013, AF 19/628/-3312

Descriptors: *Research project, Adaptive, Amplitude, Analog, Arithmetic, Bandwidth, Channel, Code, Communications, Compression, Correction, Data, Design, Detection, Digital, Error, Filtering, Function, Interpolation, Linear, Modulation, Optimum, Orthogonal, Project, Pulse, Random, Research, Sample, Shape, Signal, Statistical, Theory.

For abstract, see STAR 05 21.
N67-35370 HC$3.00 MF$0.65

STUDY AND APPLICATIONS OF RETRODIRECTIVE AND SELF-ADAPTIVE ELECTROMAGNETIC WAVE CONTROLS TO A MARS PROBE QUARTERLY REPORT, 1 OCT. - 31 DEC. 1965.
Stanford Research Inst., Menlo Park, Calif.
C. H. Dawson, C. A. Hacking, R. C. Kunzelman, J. A. Martin, and L. A. Robinson. Feb 66, 104p
NASA-CR-73119, QR-2
Contract NAS2-2933

Descriptors: *Antenna array, *Deep space, *Environmental control, *Self-adaptive system, Adaptive, Antenna, Array, Circuit, Communication, Concept, Control, Cylinder, Deep, Design, Effect, Electromagnetic, Feasibility, Gain, Lock, Loop, Mars (planet), Mission, Modulation, Omnidirectional, Phase, Planetary, Probe, Reflection, Retrodirecting, Self-adapting, Space, Spacecraft, Spin, System, Wave.

For abstract, see STAR 05 21.
N67-35372 HC$3.00 MF$0.65

TRANSIONOSPHERIC PROPAGATION OF FM SIGNALS.
Rand Corp., Santa Monica, Calif.
E. Bedrosian. Aug 67, 48p NASA-CR-88084, RM-5379-NASA
Contract NASR-21

Descriptors: *Frequency modulation, *Ionospheric propagation, *Satellite communication, Analysis, Communication, Distortion, Frequency, Function, Ionospheric, Modulation, Numerical, Output, Phase, Propagation, Satellite, Signal, Spectral, Television, Transmission.

For abstract, see STAR 05 21.
N67-35529 HC$3.00 MF$0.65

LUNAR FAR-SIDE COMMUNICATION SATELLITES.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 21.
N67-35865 HC$3.00 MF$0.65

ESFK 20-100 WATT S-BAND AMPLIFIER.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Varian Associates, San Carlos, Calif. Eimac Div.
For primary bibliographic entry see Field 9A.
For abstract, see STAR 05 21.
N67-35999 HC$3.00 MF$0.65

RESEARCH AND ADVANCED DEVELOPMENT. VOLUME II - SUPPORTING RESEARCH AND TECHNOLOGY FOR THE OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION SEMIANNUAL REVIEW, 1 JUL. - 31 DEC. 1965.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 21.
N67-36013 HC$3.00 MF$0.65

TECHNICAL STUDY - FACTORS AFFECTING THE DESIGN OF EXPERIMENTAL SYSTEMS FOR TELEVISION DISTRIBUTION BY SATELLITES, PART I, VOLUME II.
European Space Research Organization, Paris (France).
Jun 67, 490p

Descriptors: *Communications satellite, *Eldo launch vehicle, *Satellite television, Antenna, Attitude, Communication, Control, Data, Europe, Launch, Onboard, Orbit, Satellite, Telecommunication, Telemetry, Television, Transmission, Vehicle.

For abstract, see STAR 05 21.
N67-36664 HC$3.00 MF$0.65

TECHNICAL AND COST FACTORS THAT EFFECT TELEVISION RECEPTION FROM A SYCHRONOUS SATELLITE FINAL REPORT.
Atlantic Research Corp., Alexandria, Va. Jansky and Bailey Systems Engineering Dept.
30 Jun 67, 189p NASA-CR-76601, TR-PL-9037
Contract NASW-1305

Descriptors: *Cost estimate, *Synchronous satellite, *Television reception, Cost, Curve, Effectiveness, Estimate, Factor, Operation, Parameter, Power, Radiative, Reception, Satellite, Synchronous, System, Technical, Television, Value, Video.

For abstract, see STAR 05 21.
N67-36665 HC$3.00 MF$0.65

17C. Direction Finding

SPECIAL PROBLEMS IN THE ESTIMATION OF BEARING.
Memorandum rept.,
Johns Hopkins Univ Baltimore Md
T. W. Reese, J. Volkmann, S. Rogers, and I. L. Kaufman. 15 Jan 48, 49p
SPECDEV-166-1-MHC-2
Contract N5ori-166 (01)
Prepared in cooperation with Mt. Holyoke Coll., South Hadley, Mass., Dept. of Psychology and Education.

Descriptors: (*Direction finding, Performance (Human)), Accuracy, Decision making, Display systems, Targets, Naval personnel.

The subjects were asked the following special questions: (1) What effect has the length of the line of light whose bearing is to be judged on the accuracy and variability of the subject's judgments. (The line whose bearing is to be judged is referred to as the bearing indicator). (2) What happens to accuracy and variability when only the outer tip of the bearing indicator is shown. (3) What is the size of the individual differences in both accuracy and variability, and is there any relation between accuracy and variability, that is, do the most accurate subjects tend to be the least variable. The answers to these questions are: First, changing the length of the bearing indicator over a wide range (from 93% of the radius of the display screen to only 6.6% of the radius) had little effect on either the accuracy or the variability of the subjects' estimates. Secondly, the outer tip seems to be the most effective portion of the bearing marker in making accurate judgments of bearing. In fact, under the conditions of this experiment, accuracy is increased and variability reduced when only this portion of the marker is shown. Thirdly, the most accurate subject was about three times more accurate than the least accurate subject. (Author)
AD-658 891 HC$3.00 MF$0.65

17G. Navigation and Guidance

COST/BENEFIT ANALYSIS OF TELEVISED RADAR FOR GENERAL AVIATION.
Federal Aviation Administration Washington D C Systems Research and Development Service
For primary bibliographic entry see Field 1B.
AD-658 514 HC$3.00 MF$0.65

COMPUTER SIMULATION OF PINSAC MASTER INERTIAL NAVIGATION SYSTEM.
Phase rept.,
Naval Air Development Center Johnsville Pa Aero Mechanics Dept
Robert W. Tafel, Jr. 1 Aug 67, 58p Rept no. NADC-AM-6701

Descriptors: (*Inertial navigation, Simulation), Computers, Shipborne, Feasibility studies, Portable, Instrumentation, Alignment.

The report describes the methodology and results of an analytical study to determine the best estimates for the values of the alignment parameters for the Master Reference System in the Portable Inertial Navigation System Alignment Console. These estimates will be used as a base for the at-sea feasibility demonstrations of PINS and PINSAC. (Author)
AD-658 528 HC$3.00 MF$0.65

RADIOACTIVE TAXI GUIDANCE TEST CATEGORY III GROUND GUIDANCE EQUIPMENT.
Final rept.,
National Aviation Facilities Experimental Center Atlantic City N J
Fred Marschall. May 67, 18p
FAA-RD-67-9

Descriptors: (*Guidance, *Taxiing), (*Radioactive isotopes, Guidance), All-weather aviation, Pilots, Maneuverability, Airborne, Feasibility studies, Runways.

Based on the results of the demonstration, it is concluded that: (1) Radioactive taxi guidance is technically feasible. (2) Weight and volume of the present detector are excessive for the function performed. (3) The non-homogeneity of radiation source produces faulty guidance signals. (4) Pilots experience difficulty in maneuvering, due to lack of a reference to determine rate of change in the maneuver. (Author)
AD-658 742 HC$3.00 MF$0.65

AN ANALYSIS OF THE FAA RANGE INSTRUMENTATION AT NAFEC.
Final rept. 2 Sep-30 Nov 62,
Vitro Labs West Orange N J West Orange Lab
J. Smillie, J. H. Morgan, J. F. Reeves, and D. D. Steele. 25 Feb 63, 84p Rept no. VL-2296-3-0
Contract FAA/ARDS-623

Descriptors: (*Air traffic control systems, *Radar equipment), Ranges (Distance), Instrumentation, Phototheodolites, Navigation, Management planning, Personnel management, Operation.

Contents: Rapid data readout; Central data requirements; Timing system; Test planning procedures; Test planning lead time; Liaison; Systems evaluation; Equipment accuracy and area coverage; Project support capacity; Scheduling and preventive maintenance; Branch separation; Equipment engineering; Range engineering; Operation; Mixed personnel. A discussion is given of existing capacity, required capacity, operating standards and procedures, and measurements modernization program.
AD-658 893 HC$3.00 MF$0.65

AIR TRAFFIC CONTROL SYSTEMS COSTS.
Memo. rept.
Federal Aviation Administration Washington D C Systems Research and Development Service
Jun 62, 52p

Descriptors: (*Air traffic control systems, Costs), Maintenance, Navigation, Management planning, Operation, Selection, Airports, Supersonic planes.

The report contains information on the estimated costs for the establishment, maintenance and operation of ATC systems, subsystems, facilities, and equipment. It is intended to provide guidance to SRDS personnel engaged in the planning, development, testing and selection of new ATC systems and subsystems. At the present time, there is no central location within the FAA where cost information can be obtained. The document was prepared as a first step in filling that gap. Only major facilities were included in this initial effort. (Author)
AD-659 034 HC$3.00 MF$0.65

NOTES ON THE MEASUREMENT OF CONTROL LOAD AND SECTOR DESIGN IN THE EN-ROUTE ENVIRONMENT.

Federal Aviation Administration Washington D C Systems Research and Development Service
Bar-Atid Arad. Jun 64. 177p
Appendix to the final report of Project 102-11, Control Load, Control Capacity, and Optimal Sector Design. AD-429 906.

Descriptors: (*Air traffic control systems, Operations research), Air traffic, Measurement, Systems engineering, Mathematical models, Air traffic controllers, Radar, Job analysis.

The objective was to first establish a mathematical model of the enroute air traffic control sector which faithfully described the operational picture and then to set about obtaining valid numbers to satisfy the equations of the model. The objectives of the effort were to obtain a means of measuring control work and load in the sector and then develop a technique of designing sectors which balanced the load with the capacity of the controllers.
AD-659 035 HC$3.00 MF$0.65

ELECTROMAGNETIC GUIDANCE STUDY.
Mcdonnell Aircraft Corp., St. Louis, Mo.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 21.
N67-35560 HC$3.00 MF$0.65

ALIGNMENT OF INERTIAL SYSTEMS ON A MOVING BASE.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
A. H. Lipton. Sep 67. 183p NASA-TN-D-4110
Contract 180-17-01-05

Descriptors: *Alignment, *Coordinate system, *Flying platform, *Inertial guidance, Angle, Coordinate, Direction, Error, Flying, Frame, Geometry, Guidance, Inertial, Instrument, Measurement, Motion, Navigation, Platform, System, Vector.

For abstract, see STAR 05 21.
N67-35792 HC$3.00 MF$0.65

OPLE EXPERIMENT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
G. Hilton, C. Laughlin, and R. Lavigne. Jun 67. 61p NASA-TM-X-55885, X-733-67-266

Descriptors: *Data acquisition, *Experiment design, *Navigation system, *Synchronous satellite, Acquisition, Center, Collection, Control, Data, Deployment, Design, Electronic, Equipment, Experiment, Globe, Location, Navigation, Omega, Package, Platform, Position, Satellite, Synchronous, System.

For abstract, see STAR 05 21.
N67-36634 HC$3.00 MF$0.65

17H. Optical Detection

VISUAL REQUIREMENTS FOR SPOTTING,
Army Medical Research Lab Fort Knox Ky
F. S. Brackett. 20 Feb 43. 7p
Rept. on projs. 'Vision in Tanks' and 'Investigation of Periscopic Binocular Spotters'.

Descriptors: (*Tanks (Combat vehicles), *Vision), (*Binoculars, Range finding), Optical equipment, Design, Effectiveness, Optics, Specifications, Brightness, Intensity, Detection.

The purpose of the report is to determine the requirements for spotting and to recommend means for meeting them. The tank commander's visual requirements have been studied in relation to: Needs for enemy detection, rangefinding, spotting of fire, and correction of range. Three pairs of periscopic binoculars of the general characteristics and specifications given are to be developed. (Author)
AD-658 566 HC$3.00 MF$0.65

VISION IN TANKS.
Army Medical Research Lab Fort Knox Ky
11 Oct 45. 8p

Descriptors: (*Tanks (Combat vehicles), *Vision), (*Target designators, Tanks (Combat vehicles)), Detection, Periscopic gun sights, Alignment, Remote control systems, Machine guns, Tests.

The purpose of the report is to discuss a target designating device for transmission of intelligence between tank commander and tank gunner. The device consists of two pairs of remote control position indicators and transmitters--one for azimuth and one for elevation. The transmitters are connected to the commander's periscope and the indicators are located in a position easily seen by the gunner. The indicators are of the zero setting type and are bore sighted to the gun at zero setting. Movement of the commander's periscope relative to the gun in azimuth or elevation, is indicated at the gunner's position. In use the commander selects a target, gives the 'on target' signal to the gunner who traverses as indicated by the indicator. During the time the gunner is traversing the commander holds his periscope on the target. The gunner traverses and elevates the gun until the indicators are both zeroed. The target then will be in the field of his sight close to the cross hairs. (Author)
AD-658 580 HC$3.00 MF$0.65

VISUAL REQUIREMENTS, CHARACTERISTICS AND LIMITATIONS OF PRESENT VISUAL DEVICES IN TANKS AND MEANS FOR IMPROVING SIGHTING TELESCOPES AND PERISCOPES,
Army Medical Research Lab Fort Knox Ky
F. S. Brackett. 23 Jan 43. 31p

Descriptors: (*Tanks (Combat vehicles), *Vision), (*Periscopic gun sights, Tanks (Combat vehicles)), Resolution, Telescopes, Effectiveness, Illumination, Design, Optical images, Range finding, Tests.

The purpose of the report is to determine the limitations of present periscopes and sighting telescopes and to recommend means for improving them. Recommendations made are: That a better corrected optical system be substituted in the M50 series sight production at the earliest possible time--securing adequate flatness of field and resolving power. That two periscopic dual sights, of the characteristics described in the accompanying drawing be developed. That three telescopic sights of the characteristics given in the attached drawing be developed and manufactured. (Author)
AD-658 581 HC$3.00 MF$0.65

STUDY OF ERRORS IN RANGE ESTIMATION WITH THE UNAIDED EYE,
Foreign Technology Div Wright-Patterson AFB Ohio
Arthur Freedman. 30 Apr 45. 34p
Rept. on proj. 'Determination of the Visual Requirements for Various Tasks in Armored Vehicles.'

Descriptors: (*Range finding, *Tanks (Combat vehicles)), Errors, Targets, Accuracy, Terrain, Vision, Training, Performance (Human), Tables.

The purpose of the report is to study the accuracy of range estimation without visual aids among tank crew trainees with special reference to degree of accuracy obtained, possibility of preselection of the more competent individuals, improvement with training, and influence of the character of targets and terrain.
AD-658 582 HC$3.00 MF$0.65

THE ADVANTAGES OF USING BINOCULARS FOR NIGHT SEEING,
Army Medical Research Lab Fort Knox Ky
Frederick S. Brackett, Lester B. Roberts, and Wendell E. Mann. 24 Mar 45. 9p
Rept. on projs. 'Vision in Tanks' and 'Determination of the Visual Requirements for Various Tasks in Armored Vehicles.'

Descriptors: (*Binoculars, *Night vision), Light, Targets, Night warfare, Efficiency, Light transmission.

The purpose of the report is to determine the advantage of using binoculars for night seeing. In order to appraise the improvement in vision quantitatively and determine the relative contributions of objective lens diameter and power to this improvement, experiments were carried out using the (M3) 6 x 30/GI binocular (six power, 30 mm objective lens diameter) Navy 7 x 50 binocular and the 10 x 45 B.C. scope. Use of the binoculars by troops on night operation problems confirmed the practical advantages indicated by the experiments. (Author)
AD-658 583 HC$3.00 MF$0.65

MILITARY CHARACTERISTICS AND DESIGN OF OBSERVATION TELESCOPE.
Army Medical Research Lab Fort Knox Ky
1 May 45. 95p

Descriptors: (*Telescopes, Military requirements), Design, Human engineering, Mechanical drawings.

The purpose of the research was to develop the Military characteristics of observation telescopes and present designs of proposed types of instruments to meet these characteristics.
AD-658 597 Not available from CFSTI.

BINOCULAR MODIFICATION PROVIDING QUICK ADJUSTMENT OF INTERPUPILLARY DISTANCE AND DIOPTER SETTING.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 602 HC$3.00 MF$0.65

BALLOON BORNE TELESCOPE FEASIBILITY STUDY AND DESIGN.
Final rept. 1 Jun 65-30 Sep 66,
American Optical Co Pittsburgh Pa J W Fecker Div
Allan Langord, Thomas Prevenslik, and Richard Walters. Aug 67. 81p Rept no. FR-2212
AFCRL-67-0318
Contract AF 19(628)-5150

Descriptors: (*Balloons, *Telescopes), (*Instrumentation, Balloons), Design, Optical equipment, Costs, Operation, Thermal properties, Focusing, Mechanical properties, Feasibility studies, Mechanical drawings.

The document is the final report of a balloon-borne selenodetic telescope study. Several basic telescope optical systems and their characteristics are discussed with an optimum configuration selected as the basis for the final design. Mechanical structures, thermal problems, focus control, and coarse and fine trading techniques are described. A section on expected system operation costs, based on historical data from previous balloon-borne experiments, is also included. (Author)
AD-659 051 HC$3.00 MF$0.65

17I. Radar Detection

ON THE SUMS OF INDEPENDENTLY DISTRIBUTED PARETO VARIATES,
Rand Corp Santa Monica Calif
M. Blum. Aug 67. 43p Rept no. RM-5429-PR
Contract F44620-67-C-0045

Descriptors: (*Radar signals, Detection), (*Distribution functions, Mathematical models), Approximation (Mathematics), Random variables, Probability density functions, Statistical analysis, Probability.
Identifiers: Density functions, Parento distribution.

The Memorandum is an extension of certain analytic results obtained in AD-646 366, A Comparison of Average Likelihood and Maximum Likelihood Ratio Tests for Detecting Radar Targets of Unknown Doppler Frequency, L. E. Brennan, I. S. Reed, and W. Sollfrey, December 1966. It is shown that some asymptotic results derived in AD-646 366 are valid over a much broader range than originally indicated, providing a useful analytic tool for investigating more complicated radar detection problems involving signals of unknown frequency.
AD-658 430 HC$3.00 MF$0.65

AN INTEGRATED METEOR RADAR SYSTEM FOR WIND AND DENSITY MEASUREMENTS IN THE UPPER ATMOSPHERE.
Stanford Univ Calif Stanford Electronics Labs
For primary bibliographic entry see Field 4A.
AD-658 463 HC$3.00 MF$0.65

A SEQUENTIAL DETECTION SYSTEM FOR THE PROCESSING OF RADAR RETURNS,
Massachusetts Inst of Tech Lexington Lincoln Lab
Aaron A. Galvin, W. H. Drury, D. R. Bromaghim, and W. F. Kelley. 22 Mar 61, 30p Rept no. 41G-0005
ESD-TR-67-464
Contract AF 19 (604)-7400

Descriptors: (*Radar reflections, Detection), Detectors, Radar equipment, Doppler systems, Sequential analysis, Filters (Electromagnetic wave).

The report describes a system which permits a substantial reduction in the amount of equipment required for the detection of narrow-band radar returns which may fall into any part of a wide, noisy Doppler band. The system utilizes a two-step process; the first providing a coarse, high-false-alarm indication of range and Doppler, and the second providing high quality detection and parameter estimation. The basic principles are discussed, followed by a description of an experimental prototype system. Experimental results are presented. (Author)
AD-658 465 HC$3.00 MF$0.65

MEMORANDUM ON ANALYSIS OF ECHO AREA OF TARGETS USING GEOMETRICAL THEORY OF DIFRACTION AND CREEPING WAVE THEORY - 2430-1,
Ohio State Univ Columbus Electroscience Lab
C. E. Ryan, Jr. Jul 67, 83p
ESD-TR-67-519
Contract F19628-67-C-0308

Descriptors: (*Radar echo areas, Electromagnetism), Backscattering, Diffraction, Spheres, Disks, Differential equations, Theory, Radar targets, Bodies of revolution, Attenuation, Geometry.

A combination of creeping-wave analysis and diffraction theory has been developed for determining the radar cross section of bodies for which exact solutions are not available. The known solutions for the perfectly conducting cylinder and sphere have been used to specify attenuation and diffraction coefficients for the creeping wave. The creeping wave contribution is added to the geometrical optics or physical optics contribution from the specular point to determine the total scattered field. It is demonstrated that this type of solution is applicable to ogives, ogives with spherical caps, and prolate spheroids. Wedge diffraction theory has been combined with creeping wave analysis to calculate the edge-on backscatter of circular and ogival disks. It is necessary to modify the magnitudes, but not the forms, of the creeping wave attenuation and diffraction coefficients when treating a creeping wave on an edge. This form of analysis is adaptable to calculation of the radar cross section of composite bodies where both volumetric shapes and edges may occur in combination. Once the specular points, wedge diffraction points, and the attachment points and paths of the creeping waves are determined the computation of the scattered field is straightforward. (Author)
AD-658 469 HC$3.00 MF$0.65

INVESTIGATIONS ON THE DIRECTIVITY OF CIRCULAR ANTENNA ARRAYS IN COMPARISON WITH THE BEAMWIDTH OF PARABOLIC REFLECTORS IN THE DECIMETER AND CENTIMETER WAVE BAND.
Waechtler (Maximilian) Hamburg (Germany)
For primary bibliographic entry see Field 9E.
AD-658 490 HC$3.00 MF$0.65

A HIGH-RANGE-RESOLUTION RADAR: INTERIM REPORT.
Research and development rept.,
Navy Electronics Lab San Diego Calif
J. H. Maynard, B. F. Summers, and D. R. Wehner. 17 Apr 67, 63p Rept no. NEL-1453

Descriptors: (*Radar equipment, Radar tracking), Radar targets, Power amplifiers, Radar antennas, Design, Radar receivers, Bandwidth, Radar signals, Attenuation, Resolution, Distortion, Radar duplexers, Naval research.

Basic components have been developed for a radar system with highly versatile wave-form capability. The power amplifier has a 600-Mc/s bandwidth centered at 3.2 Gc/s, prf to 30 kc/s, pulse lengths to 80 microseconds with duty-cycle upper limit of 0.03, and a short-time phase stability of 0.01 second. The first signal form to be implemented with the test model has been completed. (Author)
AD-658 509 HC$3.00 MF$0.65

THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD PROCESSING. VOLUME I,
Cook Electric Co Morton Grove Ill
For primary bibliographic entry see Field 9D.
AD-658 613 Not available from CFSTI.

THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD PROCESSING. VOLUME II,
Cook Electric Co Morton Grove Ill
For primary bibliographic entry see Field 9D.
AD-658 614 Not available from CFSTI.

THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD PROCESSING. VOLUME III,
Cook Electric Co Morton Grove Ill
For primary bibliographic entry see Field 9D.
AD-658 615 Not available from CFSTI.

THE EFFECTS OF WATER VAPOR ON THE ELECTRON DENSITY OF SHOCK HEATED AIR,
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 20I.
AD-658 719 HC$3.00 MF$0.65

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5A.
AD-658 834 HC$3.00 MF$0.65

SHORT-PULSE SCATTERING BY A HEMISPHERE.
Technical rept.,
Massachusetts Inst of Tech Lexington Lincoln Lab
Stephen D. Weiner. 18 Jul 67, 55p Rept no. TR-436
ESD-TR-67-331
Contract AF 19 (628)-5167, ARPA Order-498

Descriptors: (*Radar pulses, Scattering), Hemispherical shells, Polarization, Backscattering, Diffraction, Electromagnetic waves, Theory.

The radar scattering by a conducting hemisphere for incidence along the symmetry axis has been determined as a function of frequency, bistatic angle, and polarization. From this frequency domain information, the short-pulse response is constructed using Fourier synthesis. The range resolution thus afforded permits identification of various contributions to the scattering - in particular, that due to edge diffraction. Results obtained from the geometrical theory of diffraction are in qualitative agreement with those obtained here. (Author)
AD-658 836 HC$3.00 MF$0.65

AN ANALYSIS OF THE FAA RANGE INSTRUMENTATION AT NAFEC.
Vitro Labs West Orange N J West Orange Lab
For primary bibliographic entry see Field 17G.
AD-658 893 HC$3.00 MF$0.65

RADAR MEASUREMENTS AT 70 cm OF VENUS AND MERCURY,
Arecibo Ionospheric Observatory Puerto Rico
For primary bibliographic entry see Field 3A.
AD-658 955 Not available from CFSTI.

R.R.E. NEWSLETTER AND RESEARCH REVIEW.
Royal Radar Establishment, Malvern (England). Ministry of Technology.
Mar 67, 93p REPT.-6

Descriptors: *Crystal growth, *Field effect transistor (fet), *Pulse radar, *Semiconductor laser, Alloy, Arsenide, Backscatter, Cadmium, Circuit, Crystal, Detector, Effect, Fet, Field, Film, Gallium, Growth, Infrared, Integration, Ionosphere, Laser, Oscillation, Pulse, Radar, Sapphire, Semiconductor, Single, Sulfide, Transistor.

For abstract, see STAR 05 21.
N67-36063 HC$3.00 MF$0.65

17J. Seismic Detection

TRAVEL - TIME ANOMALIES AT LASA,
Massachusetts Inst of Tech Lexington Lincoln Lab
D. E. Frankowski, and F. A. Klappenberger. 7 Jul 67, 51p Rept no. LL-6
ESD-TR-67-463
Contract AF 19 (628)-5167, ARPA Order-512
Supersedes AD-645 331.

Descriptors: (*Seismological stations, Seismology), (*Seismic waves, Propagation), Seismometers, Time, Anomalies, Data processing systems, Errors, Statistical analysis, Phase, Alignment, Montana.
Identifiers: LASA.

World-wide average travel-time curves are inadequate to permit optimum phasing of teleseismic signals. Phase alignment corrections in the form of station relative travel-time anomalies of LASA, based on approximately 570 events, are presented. (Author)
AD-658 492 HC$3.00 MF$0.65

AMPLITUDE ANOMALIES AT LASA,
Massachusetts Inst of Tech Lexington Lincoln Lab
P. W. Broome, F. A. Klappenberger, and D. E. Frankowski. 9 Aug 67, 72p Rept no. LL-7 ESD-TR-67-478
Contract AF 19 (628)-5167, ARPA Order-512
Supersedes AD-647 260.

Descriptors: (*Seismic waves, *Anomalies), Seismometers, Experimental data, Seismological stations, Data processing systems, Errors, Statistical analysis.
Identifiers: LASA.

Average amplitude anomalies are presented as functions of source region. Data from approximately 300 events were used in this analysis. (Author)
AD-658 495 HC$3.00 MF$0.65

ANALYSIS OF A 'SEISMIC FENCE' FOR INTRUSION DETECTION (EXPERIMENTAL AND THEORETICAL RESULTS).
Technical rept.,
Army Electronics Command Fort Monmouth N J
Kenneth J. Murphy, and Kurt Ikrath. May 67, 69p Rept no. ECOM-2848

Descriptors: (*Seismic waves, *Detection), Mathematical models, Portable, Theory, Soils, Excitation, Microseisms, Effectiveness, Tests.

The report describes experiments with an active seismic system for detecting the approach of personnel and vehicles and presents in detail a mathematical model for the seismic phenomena involved. In the experiments, a 'seismic fence' was set up between a seismic transmitter and a seismic detector located about 100 feet apart. A person walking between the two units is detected as a disturbance in the delicately balanced seismic loop. Data from field tests verify the validity of the mathematical model described. (Author)
AD-658 654 HC$3.00 MF$0.65

18. NUCLEAR SCIENCE AND TECHNOLOGY

18A. Fusion Devices (Thermonuclear)

SOUND WAVES IN PLASMAS A BASIC PHENOMENON AND A SIMPLE DIAGNOSTIC TOOL,
Oak Ridge National Lab., Tenn.
Wm. Denver Jones. Jul 67, 26p
Contract W-7405-eng-26

Descriptors: (*Plasma physics, Sound), (*Electron density, *Plasma medium), Plasma oscillations, Wave transmission.

For abstract, see NSA 21 19.
ORNL-4089 HC$3.00 MF$0.65

18B. Isotopes

DEVELOPMENT OF 60 CO CAPSULES FOR HEAT SOURCES,
du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
Charles P. Ross, Carl L. Angerman, and Franklin D. R. King. Jun 67, 49p
Contract AT (07-2)-1

Descriptors: (*Cobalt, *Radioactive isotopes), (*Encapsulation, Materials), Containers, Nuclear engineering, Electric power production.

For abstract, see NSA 21 19.
DP-1096 HC$3.00 MF$0.65

TERRESTRIAL LOW-POWER REACTOR PROGRAM QUARTERLY PROGRESS REPORT FOR PERIOD ENDING MARCH 31, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 19.
ORNL-4136 HC$3.00 MF$0.65

RADIONUCLIDE STANDARDIZATION. A BIBLIOGRAPHY,
National Center for Radiological Health, Rockville, Md.
George I. Coats. Apr 67, 42p
PHS-999-RH-25

Descriptors: (*Radioactive isotopes, Standardization), Bibliographies, Counting methods, Coincidence counting, Beta particles, Gamma rays, X rays, Alpha particles, Scintillation counters, Ionization chambers, Calorimeters, Films, Standards, Calibration.

The bibliography contains references on absolute counting (23); coincidence technique, formula and corrections (41); calibration by beta and 4 pi beta methods (89), beta-gamma coincidence (32), gamma-gamma coincidence and gamma counting (27), x-ray-gamma coincidences (17), alpha-gamma coincidence (7), liquid scintillation counters (14), ion chambers and calorimeters (9), coincidence circuits (48); dead time and statistics (32); thin films (21); sample preparations, back scattering and self-absorption (30); maintenance and storage of standards (9); intercomparison of solutions (7); and general references (12). (Author)
PB-176 049 HC$3.00 MF$0.65

18C. Nuclear Explosions

A MODEL FOR THE GENERATION OF MAGNETOHYDRODYNAMIC WAVES BY HIGH-ALTITUDE NUCLEAR BURSTS,
Rand Corp Santa Monica Calif
R. F. Lutomirski. Aug 67, 55p Rept no. RM-5301-ARPA
Contracts DAHC15-67-C-0141, SD-79

Descriptors: (*Magnetohydrodynamics, Mathematical models), (*Nuclear explosions, Magnetohydrodynamics), Airburst, High altitude, Theory, Terrestrial magnetism, Electromagnetic waves, Propagation.

A model for the generation of magnetohydrodynamic waves by high-altitude nuclear bursts is presented which approximates the physical conditions present immediately following the detonation of a nuclear device. This model of the debris expanding into the upper ionosphere-exosphere is taken to be a conducting sphere expanding at a constant velocity into a magnetoplasma, pushing the magnetic field aside and then abruptly stopping. It is found that the system does exhibit hydromagnetic radiation, which is calculated, and that this radiation can in some cases be much less than the hydromagnetic yield of the device. For a given device, the radiation depends strongly on the local value of the Alfven speed at the burst altitude. (Author)
AD-658 716 HC$3.00 MF$0.65

THERMOCHEMICAL RELATIONS FOR WATER AT HIGH TEMPERATURES AND PRESSURES,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 7D.
AD-658 821 HC$3.00 MF$0.65

FORTRAN BKW A CODE FOR COMPUTING THE DETONATION PROPERTIES OF EXPLOSIVES,
Los Alamos Scientific Lab., N. Mex.
Charles L. Mader. 1 May 67, 47p
Contract W-7405-eng-36

Descriptors: (*Explosive materials, Heat of formation), (*Detonations, *Equations of state), Programming languages, Computer programs.

For abstract, see NSA 21 19.
LA-3704 HC$3.00 MF$0.65

THE INTERACTION OF A LONG DURATION FRIEDLANDER SHAPED BLAST WAVE WITH AN INFINITELY LONG RIGHT CIRCULAR CYLINDER. INCIDENT BLAST WAVE 20.7 PSI, POSITIVE DURATION 50 MS AND A 16 CM DIAMETER CYLINDER.
Atomic Weapons Research Establishment, Aldermaston (England).
V. J. Bishop, and R. D. Rowe. Apr 67, 61p
AWRE-O-38/67

Descriptors: *Circular cylinder, *Shock wave, *Wave interaction, Circular, Coefficient, Curve, Cylinder, Drag, Duration, Infinite, Interaction, Long, Overpressure, Pressure, Right, Shape, Shock, Time, Wave.

For abstract, see STAR 05 21.
N67-35632 HC$3.00 MF$0.65

INSTRUMENTATION AND CONTROLS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 1, 1966.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 19.
ORNL-4091 HC$3.00 MF$0.65

18D. Nuclear Instrumentation

AN EXPERIMENTAL EVALUATION OF VARIOUS GAMMA DOSIMETRY SYSTEMS,
Army Nuclear Defense Lab Edgewood Arsenal Md
Nancy N. Gibson, Armand M. Pelletier, Curtis G. Hilton, John R. Jacobson, and John H. McNeilly. Aug 67, 46p Rept no. NDL-TR-91

Descriptors: (*Dosimeters, Acceptability), (*Gamma counters, Acceptability), Radiation measurement systems, Accuracy, Exposure, Neutron reactions, Shielding, Sensitivity.

An evaluation of the gamma dosimetry systems presently in use at the US Army Nuclear Defense Laboratory (USANDL) was conducted at the KIWI-TNT reactor-safety experiment. This evaluation investigated the consistency of gamma exposure measurements obtained in all mixed radiation environments and determined possible sources of error in these measurements. Dosimetry systems evaluated were film, silver-activated metaphosphate glass rods and plates, cobalt-activated borosilicate glass plates, and manganese-activated calcium floride thermoluminescent dosimeters. The results of this experiment are in agreement with those obtained in other mixed radiation environments, as follows: The AgPO3 glass rods, the cobalt glass plates, the 1290 film, the AgPO3 glass plates (optical density technique), and the TLD exhibited approximately 10 percent reproducibility; optimum performance was obtained by exposing the dosimetry in energy discrimination shields and thermal neutron shields and applying numerical corrections for fast neutron effects; agreement between the different systems was approximately 20 percent to 40 percent when the dosimetry was utilized as described above; the accuracy of fast and thermal neutron sensitivities previously reported for these dosimetry systems was questionable. (Author)
AD-658 658 HC$3.00 MF$0.65

DEVELOPMENT OF A SEMIRAD DETECTION SYSTEM FOR HIGH-INTENSITY NEUTRON RADIATION.
Final technical rept.,
Space and Missile Systems Organization Los Angeles Air Force Station Calif
F. C. Riggin, and H. J. Cooley. 27 Jun 67, 91p
Rept no. NUCOR-031767
USNRDL-TRC-67-27
Contract N228 (62479)64869

Descriptors: (*Dosimeters, Design), (*Neutron detectors, Design), Construction, Tests, Operation, Pulse amplifiers, Vacuum pumps, Noise.
Identifiers: SEMIRAD.

The design, fabrication and testing of a detection system to measure pulses of high intensity neutron radiation is discussed. The system includes a neutron detecting component operating on the SEMIRAD principle and a 'stretcher' amplifier component capable of accepting the output pulse from the detector, shaping and amplifying the pulse so that the time-integral of the pulse waveform is proportional to the neutron dose. The system was made to operate over the temperature range of -28C to +65C by modification of the detector design to permit constant vac-ion pumping even during burst time. This was considered necessary because of the hydrogenous liner outgassing as a result of elevated operating temperatures as well as the high intensity neutron pulses. The design goal of a unity gamma to neutron response ratio was achieved for fission spectrum neutrons. The amplifier itself generates a noise signal which is proportional to the incident burst yield and should be operated remotely from the detector (20 to 40 ft. cable lengths) and shielded if possible. Sufficient radiation hardness was demonstrated in the selection of amplifier components from exposure of one 'stretcher' amplifier to a total dose of 26,600 rads with no detectable change in operability. (Author)
AD-658 741 HC$3.00 MF$0.65

USE OF COMPUTERS IN ANALYSIS OF EXPERIMENTAL DATA AND THE CONTROL OF NUCLEAR FACILITIES.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
CONF-660527 HC$3.00 MF$0.65

JPDR THERMAL AND HYDRAULIC CHARACTERISTICS MEASURED BY AN INSTRUMENTED FUEL ASSEMBLY (IFA) AND THEIR ANALYSES BY A COMPUTER CODE " J P- HYDRO".
Japan Atomic Energy Research Inst., Tokyo.
For primary bibliographic entry see Field 18I.
For abstract, see STAR 05 21.
N67-36144 HC$3.00 MF$0.65

INSTRUMENTATION AND CONTROLS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 1, 1966.
Oak Ridge National Lab., Tenn.
Jun 67, 242p
Contract W-7405-eng-26

Descriptors: (*Tunnel diodes, Signal-to-noise ratio), (*Electron accelerators, Instrumentation), Power supplies, Feedback, Phase shift.

For abstract, see NSA 21 19.
ORNL-4091 HC$3.00 MF$0.65

MOLTEN-SALT REACTOR PROGRAM SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING FEBRUARY 28, 1967.
Oak Ridge National Lab., Tenn.
Jul 67, 222p
Contract W-7405-eng-26

Descriptors: (*Fused salts cooled reactors, Reactor materials), (*Reactor fuels, *Power reactors), Breeder reactors.

For abstract, see NSA 21 19.
ORNL-4119 HC$3.00 MF$0.65

SUMMARIES OF RESEARCH IN HIGH ENERGY PHYSICS.
Division of Research (AEC), Washington, D. C.
Jul 67, 150p

Descriptors: (*Synchrotrons, *Bevatrons), (*Electron accelerators, *Linear accelerators), Particle accelerators, Nuclear physics laboratories.

For abstract, see NSA 21 19.
TID-4005-Pt-6-Rev HC$3.00 MF$0.65

ANALYTICAL CAPABILITIES OF A SEMICONDUCTOR X-RAY EMISSION SPECTROMETER,
California Univ., Berkeley. Lawrence Radiation Lab.
Earl K. Hyde, Harry R. Bowman, and David H. Sisson. May 66, 34p
Contract W-7405-eng-48

Descriptors: (*X rays, Emissivity), (*Americium, *Radioactive isotopes), Diodes (Semiconductor), Excitation, Detectors, Spectroscopy.

For abstract, see NSA 21 19.
UCRL-16845 HC$3.00 MF$0.65

EXPERIMENTAL RESULTS OF SELECTION AND BIASING OF FETS FOR LOW-ENERGY X-RAY AND GAMMA-RAY SPECTROMETERS,
California Univ., Berkeley. Lawrence Radiation Lab.
Richard C. Jared, and George W. Kilian. May 67, 14p
Contract W-7405-eng-48

Descriptors: (*Nuclear radiation spectrometers, Gamma rays), (*Transistors, Voltage), Radiation measurement systems, Detectors, Instrumentation, Preamplifiers, Signal-to-noise ratio, X rays.

For abstract, see NSA 21 19.
UCRL-17528 HC$3.00 MF$0.65

STATITRON A LOW-ENERGY PULSED ELECTRON ACCELERATOR,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 20G.
For abstract, see NSA 21 19.
UCRL-50215 HC$3.00 MF$0.65

TRANSMISSION OF 14-MEV NEUTRONS IN LIQUID NITROGEN,
California Univ., Livermore. Lawrence Radiation Lab.
Myron Heusinkveld. 9 Jun 67, 23p
Contract W-7405-eng-48

Descriptors: (*Neutrons, *Liquefied gases), (*Radiation measurement systems, *Gamma-ray absorption coefficients).

For abstract, see NSA 21 19.
UCRL-50259 HC$3.00 MF$0.65

18F. Radiation Shielding and Protection

GRAMS A FORTRAN PROGRAM TO SOLVE GAMMA RAY PENETRATION PROBLEMS IN MULTISLAB SHIELDS. VOLUME I. NUMERICAL METHODS,
Atomics International, Canoga Park, Calif.
Bruce D. O'Reilly, and Richard C. Lewis. 22 Jun 67, 60p
Contract AT (04-3)-701

Descriptors: (*Reactor shielding calculations, *Programming (Computers)), (*Gamma rays, Penetration), Numerical analysis, Problem solving.

For abstract, see NSA 21 19.
NAA-SR-12337-Vol-I HC$3.00 MF$0.65

AMC A MONTE CARLO CODE UTILIZING THE ALBEDO APPROACH FOR CALCULATING NEUTRON AND CAPTURE GAMMA-RAY DISTRIBUTIONS IN RECTANGULAR CONCRETE DUCTS,
Oak Ridge National Lab., Tenn.
R. E. Maerker, and V. R. Cain. Aug 67, 125p
Contract W-7405-eng-26
See also AD-656 047.

Descriptors: (*Ducts, Concrete), (*Neutron capture gamma rays, Monte Carlo method), Albedo, Geometry, Programming (Computers), Interactions.

For abstract, see NSA 21 19.
ORNL-3964 HC$3.00 MF$0.65

MEASUREMENTS AND SINGLE-VELOCITY CALCULATIONS OF DIFFERENTIAL ANGULAR THERMAL-NEUTRON ALBEDOS FOR CONCRETE,
Oak Ridge National Lab., Tenn.
R. E. Maerker, and F. J. Muckenthaler. Jul 67, 54p
Contract W-7405-eng-26
See also AD-656 085.

Descriptors: (*Thermal neutrons, *Albedo), (*Ducts, Concrete), Monte Carlo method, Scattering, Shielding, Neutron capture gamma rays.

For abstract, see NSA 21 19.
ORNL-4090 HC$3.00 MF$0.65

18G. Radioactive Wastes and Fission Products

ARCHEOLOGICAL SALVAGE EXCAVATIONS ON THE MESITA DEL BUEY, LOS ALAMOS COUNTY, NEW MEXICO,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 8G.
For abstract, see NSA 21 19.
LA-3636 HC$3.00 MF$0.65

18H. Radioactivity

THE HALF-LIFE AND MASS OF 43Ti,
Florida State Univ Tallahassee Dept of Physics
A. M. Aldridge, H. S. Plendl, and J. P. Aldridge, III. 7 Mar 67, 9p
AFOSR-67-2183
Grants AF-AFOSR-440-67, NSF-GP-5114
Availability: Published in Nuclear Physics vA98 p323-9 1967.

Descriptors: (*Titanium, *Half life), (*Beta decay, Titanium), Radioactive isotopes, Nuclear properties, Calcium, Alpha particle reactions, Nuclear cross sections.
Identifiers: Mass.

The mass and beta-decay half-life for titanium-43 was measured using the 40Ca (alpha, n)43Ti reaction. The mass excess (12C scale) was determined to be -29325 plus or minus 15 keV from a value of 12290 plus or minus 10 keV for the reaction

threshold. The corresponding beta end-point energy was calculated to be 5.83 plus or minus 0.02 MeV. The half-life of 43Ti was measured to be 0.49 plus or minus 0.01 sec. The corresponding log ft value is 3.47 plus or minus 0.03. (Author)
AD-658 662 Not available from CFSTI.

FALLOUT SIMULANT DEVELOPMENT: TEMPERATURE EFFECTS ON THE SORPTION REACTIONS OF CESIUM ON FELDSPAR, CLAY, AND QUARTZ,
Stanford Research Inst Menlo Park Calif
William B. Lane. Mar 67, 48p
Contract N00228-66-C-1118

Descriptors: (*Radioactive fallout, Substitutes), (*Cesium, Sorption), (*Minerals, Sorption), Simulation, Feldspar, Clay minerals, Quartz, Radioactive isotopes, Adsorption, Fission product activity.

Procedures were developed for the preparation of synthetic fallout with which to study the availability of cesium. Mineral particles were tagged with Cs-137 and heated to a series of temperatures including 1500C. The effect of hese thermal treatments on the availability of cesium was evaluated by leaching in 0.1N HCl. Surface adsorption effects were measured on particles that were not heated. The reproducibility of the results obtained by those procedures was tested by preparing a batch of synthetic fallout with specified properties for studies of the uptake and retention of cesium by animals. (Author)
AD-658 745 HC$3.00 MF$0.65

VAN ALLEN BELT SIMULATION.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 22B.
AD-658 780 Not available from CFSTI.

MODELS OF GROUND ROUGHNESS IN A FALLOUT FIELD,
Naval Radiological Defense Lab San Francisco Calif
Philip A. Read. 26 Sep 67, 64p Rept no.
USNRDL-TR-67-84

Descriptors: (*Radioactive fallout, Terrain), Gamma rays, Models (Simulations), Detectors, Measurement, Roughness.

Gamma radiation from fallout particles deposited on rough ground is attenuated compared to that from particles on a smooth plane. In this report six models of ground roughness are considered. Ground roughness factors are found for each of the models, allowing one to correct from the calculated exposure rate due to unscattered radiation for a smooth field, provided the parameters of the model can be component are found in some cases. Experimental angular roughness factors are compared with those of the models. It is found that one model, the uniform volume source model, fits all the data well, and that the uniform absorbing layer model also fits the data satisfactorily. The more exotic models give angular roughness functions which have the wrong properties to fit the observed data. (Author)
AD-658 878 HC$3.00 MF$0.65

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON FAST CRITICAL EXPERIMENTS AND THEIR ANALYSIS HELD AT ARGONNE NATIONAL LABORATORY, ILLINOIS, OCTOBER 10-13, 1966.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
ANL-7320 HC$3.00 MF$0.65

USE OF COMPUTERS IN ANALYSIS OF EXPERIMENTAL DATA AND THE CONTROL OF NUCLEAR FACILITIES.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
CONF-660527 HC$3.00 MF$0.65

ABSOLUTE E1, DELTA K EQUALS O TRANSITION RATES IN ODD-MASS PM AND EU-ISOTOPES.
Aktiebolaget Atomenergi, Stockholm (Sweden). S. G. Malmskog. Jul 67, 34p AE-287

Descriptors: *Europium, *Isotope, *Promethium, *Transition probability, Absolute, Coincidence, Delay, Dipole, Excitation, Half-life, Intrinsic, Mass, Method, Probability, Rate, State, Transition.

For abstract, see STAR 05 21.
N67-36570 HC$3.00 MF$0.65

TERRESTRIAL LOW-POWER REACTOR PROGRAM QUARTERLY PROGRESS REPORT FOR PERIOD ENDING MARCH 31, 1967.
Oak Ridge National Lab., Tenn.
Jul 67, 38p
Contract W-7405-eng-26

Descriptors: (*Boiling water reactors, Nuclear power plants), (*Pressurized water reactors, Design), Economics, Nuclear reactors.

For abstract, see NSA 21 19.
ORNL-4136 HC$3.00 MF$0.65

18I. Reactor Engineering and Operation

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON FAST CRITICAL EXPERIMENTS AND THEIR ANALYSIS HELD AT ARGONNE NATIONAL LABORATORY, ILLINOIS, OCTOBER 10-13, 1966.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
ANL-7320 HC$3.00 MF$0.65

NUCLEAR ENGINEERING DEPARTMENT ANNUAL REPORT, DECEMBER 31, 1966.
Brookhaven National Lab., Upton, N. Y.
31 Dec 66, 191p
Contract AT (30-2)-GEN-16

Descriptors: (*Nuclear engineering, *Nuclear power plants), (*Reactor materials, Fission products), Reactor fuels, Water, Desalination, Metallurgy, Superconductivity.

For abstract, see NSA 21 19.
BNL-50023 HC$3.00 MF$0.65

PLUTONIUM ABSTRACTS. VOLUME 7, NUMBER 4,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
Barbara G. Russell. 30 Apr 67, 27p
Contract AT (45-1)-1830

Descriptors: (*Plutonium, Abstracts), (*Biology, *Medicine), Chemistry, Health physics, Safety, Metallurgy, Ceramic materials, Physics, Nuclear reactors, Nuclear engineering.

For abstract, see NSA 21 19.
BNWL-446-Vol-7-No-4 HC$3.00 MF$0.65

PLUTONIUM ABSTRACTS. VOLUME 7, NUMBER 5,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
Barbara G. Russell. 31 May 67, 73p
Contract AT (45-1)-1830

Descriptors: (*Plutonium, Abstracts), Biology, Medicine, Chemistry, Health physics, Safety, Metallurgy, Ceramic materials, Physics, Nuclear engineering.

For abstract, see NSA 21 19.
BNWL-486-Vol-7-No-5 HC$3.00 MF$0.65

USE OF COMPUTERS IN ANALYSIS OF EXPERIMENTAL DATA AND THE CONTROL OF NUCLEAR FACILITIES.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
CONF-660527 HC$3.00 MF$0.65

RAPID (REACTOR AND PLANT INTEGRATED DYNAMICS) COMPUTER PROGRAM,
Los Alamos Scientific Lab., N. Mex.
Carl A. Anderson, Jr. 10 Nov 66, 184p
Contract W-7405-eng-36

Descriptors: (*Computer programs, *Digital computers), (*Nuclear power plants, *Reactor safety systems), Reactor cores, Reactor coolants.

For abstract, see NSA 21 19.
LA-3694 HC$3.00 MF$0.65

ANALYSIS OF SNAPTRAN-1 AND -2 REACTOR KINETICS EXPERIMENTS,
Atomics International, Canoga Park, Calif.
J. F. Jackson, W. F. Rhoades, and L. I. Moss. 26 Jun 67, 164p
Contract AT (04-3)-701

Descriptors: (*Reactor kinetics, *Reactor shutdown), (*Auxiliary power plants, *Reactor safety systems), Reactor operation.

For abstract, see NSA 21 19.
NAA-SR-11850 HC$3.00 MF$0.65

THE SYSTEMS-QUALITY SODIUM LOOP DESIGN, CONSTRUCTION, AND STARTUP,
Atomics International, Canoga Park, Calif.
E. W. Murbach, J. E. Bodine, and N. W. Heath. 31 May 67, 38p
Contract AT (04-3)-701

Descriptors: (*Reactor start-up sources, *Fast reactors), (*Sodium, *Specifications), Impurities, Breeder reactors.

For abstract, see NSA 21 19.
NAA-SR-12327 HC$3.00 MF$0.65

SNAP REACTOR ABLATION DISINTEGRATION EXPERIMENT (RADE) IN A HYPERTHERMAL WIND TUNNEL,
Atomics International, Canoga Park, Calif.
J. E. Arnold, and L. D. Montgomery. 30 Jun 67, 132p
Contract AT (04-3)-701

Descriptors: (*Auxiliary power plants, *Wind tunnels), Ablation, Test facilities, Nuclear reactors.

For abstract, see NSA 21 19.
NAA-SR-12382 HC$3.00 MF$0.65

SRE-PEP PUMP PERFORMANCE,
Atomics International, Canoga Park, Calif.
C. L. Peckinpaugh. 6 Jun 67, 41p
Contract AT (04-3)-701

Descriptors: (*Pumps, Performance (Engineering)), (*Nuclear reactors, *Sodium), Oil seals, O-rings, Heat transfer.

For abstract, see NSA 21 19.
NAA-SR-12409 HC$3.00 MF$0.65

ANALOG COMPUTER STUDY OF THE DYNAMICS OF THE MRP COMBINED ROTATING UNIT SHAFT-BEARING SYSTEM. HYDROSTATIC FORCE IMPROVEMENT,
Atomics International, Canoga Park, Calif.
David Terris. 29 Jun 67, 68p
Contract AT (04-3)-701

Descriptors: (*Journal bearings, *Shafts), (*Hydrostatic pressure, *Loading (Mechanics)), Damping, Analog computers, Computer programs.

For abstract, see NSA 21 19.
NAA-SR-12411 HC$3.00 MF$0.65

EVALUATION OF SNAP REACTOR DISPOSAL TECHNIQUES,
Atomics International, Canoga Park, Calif.
D. K. Nelson, and R. L. Detterman. 30 Jun 67, 76p
Contract AT (04-3)-701

Descriptors: (*Auxiliary power plants, Reactor operation), (*Fission products, Disposal), Atmosphere entry, Reactor safety systems, Space stations, Radiation hazards, Dose rate.

For abstract, see NSA 21 19.
NAA-SR-12433 HC$3.00 MF$0.65

DETERMINATION OF LATTICE PARAMETERS USING A FEW RODS.
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
D. S. Craig, and A. Okazaki. Mar 67, 83p AECL-2593

Descriptors: *Fuel element, *Lattice, *Uranium, *Water moderated reactor, Buckling, Deuterium, Element, Fuel, Moderation, Oxide, Parameter, Reactor, Rod, Water.

For abstract, see STAR 05 21.
N67-35832 HC$3.00 MF$0.65

A VISUAL STUDY OF FORCED CONVECTION BOILING. PART 2 - FLOW PATTERNS AND BURNOUT FOR A ROUND TEST SECTION.
Atomic Energy Establishment, Winfrith (England). Reactor Development Div.
For primary bibliographic entry see Field 20D.
For abstract, see STAR 05 21.
N67-35878 HC$3.00 MF$0.65

JPDR THERMAL AND HYDRAULIC CHARACTERISTICS MEASURED BY AN INSTRUMENTED FUEL ASSEMBLY (IFA) AND THEIR ANALYSES BY A COMPUTER CODE " J P- HYDRO".
Japan Atomic Energy Research Inst., Tokyo.
Jul 67, 21p JAERI-1136

Descriptors: *Hydraulics, *Nuclear fuel, *Reactor technology, *Thermal radiation, Assembly, Characteristics, Circulation, Code, Computer, Flow, Fuel, Instrumentation, Measurement, Nuclear, Radiation, Rate, Reactor, Technology, Thermal.

For abstract, see STAR 05 21.
N67-36144 HC$3.00 MF$0.65

AMC A MONTE CARLO CODE UTILIZING THE ALBEDO APPROACH FOR CALCULATING NEUTRON AND CAPTURE GAMMA-RAY DISTRIBUTIONS IN RECTANGULAR CONCRETE DUCTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 19.
ORNL-3964 HC$3.00 MF$0.65

MEASUREMENTS AND SINGLE-VELOCITY CALCULATIONS OF DIFFERENTIAL ANGULAR THERMAL-NEUTRON ALBEDOS FOR CONCRETE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 19.
ORNL-4090 HC$3.00 MF$0.65

INSTRUMENTATION AND CONTROLS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 1, 1966.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 19.
ORNL-4091 HC$3.00 MF$0.65

MOLTEN-SALT REACTOR PROGRAM SEMI-ANNUAL PROGRESS REPORT FOR PERIOD ENDING FEBRUARY 28, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 19.
ORNL-4119 HC$3.00 MF$0.65

TERRESTRIAL LOW-POWER REACTOR PROGRAM QUARTERLY PROGRESS REPORT FOR PERIOD ENDING MARCH 31, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 19.
ORNL-4136 HC$3.00 MF$0.65

18J. Reactor Materials

SPECIFIC HEATS AND HEATS OF TRANSFORMATION OF ZIRCALOY-2 AND LOW-NICKEL ZIRCALOY-2,
Battelle Memorial Inst., Columbus, Ohio.
Edward A. Eldridge, and Herbert W. Deem. 31 May 67, 17p
Contract W-7405-eng-92

Descriptors: (*Reactor fuels, *Specific heat), (*Reactor fuel cladding, Transformations), Nickel alloys, Zirconium alloys, Tin alloys, Enthalpy, Solubility.

For abstract, see NSA 21 19.
BMI-1803 HC$3.00 MF$0.65

DESIGN OF A CAPSULE FOR IRRADIATION NEAR 2000 C,
Battelle Memorial Inst., Columbus, Ohio.
William J. Zielenbach, and Joseph W. Ray. 6 Jul 67, 24p
Contract W-7405-eng-92

Descriptors: (*Encapsulation, Design), (*Nuclear radiation, Temperature control), High-temperature research, Predictions.

For abstract, see NSA 21 19.
BMI-1808 HC$3.00 MF$0.65

NUCLEAR ENGINEERING DEPARTMENT ANNUAL REPORT, DECEMBER 31, 1966.
Brookhaven National Lab., Upton, N. Y.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
BNL-50023 HC$3.00 MF$0.65

PLUTONIUM ABSTRACTS. VOLUME 7, NUMBER 4,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
BNWL-446-Vol-7-No-4 HC$3.00 MF$0.65

PLUTONIUM ABSTRACTS. VOLUME 7, NUMBER 5,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
BNWL-486-Vol-7-No-5 HC$3.00 MF$0.65

AEC FUELS AND MATERIALS DEVELOPMENT PROGRAM PROGRESS REPORT NO. 67.
General Electric Co., Cincinnati, Ohio. Nuclear Materials and Propulsion operation.
30 Jun 67, 178p
Contract AT (40-1)-2847

Descriptors: (*Reactor fuel cladding, *Fast reactors), (*Reactor materials, Radiation damage), Reactor fuel elements, Pressure vessels, Heat-resistant metals + alloys, Stresses, Rupture, Creep.

For abstract, see NSA 21 19.
GEMP-67 HC$3.00 MF$0.65

DIRECT CARBON REPLICATION OF URANIUM TETRAFLUORIDE FILMS ON URANIUM DIOXIDE,
Los Alamos Scientific Lab., N. Mex.
W. P. Ellis, and Dana L. Douglass. 3 Apr 67, 12p
Contract W-7405-eng-36

Descriptors: (*Uranium compounds, *Fluorides), Carbon, Metal films, Dioxides.

For abstract, see NSA 21 19.
LA-3705 HC$3.00 MF$0.65

GAS-COLLECTION TECHNIQUE FOR MEASUREMENT OF FISSION-GAS RETENTION IN IRRADIATED MO-UO2 CERMETS,
Los Alamos Scientific Lab., N. Mex.
A. J. Patrick. 17 May 67, 6p
Contract W-7405-eng-36

Descriptors: (*Cermets, *Nuclear radiation), (*Molybdenum compounds, *Uranium compounds), Dioxides, Nuclear radiation, Fission products, Collecting methods, Gamma rays, Gases, Recovery.

For abstract, see NSA 21 19.
LA-3718 HC$3.00 MF$0.65

IRRADIATION TEST OF SNAP 8 CANDIDATE SPRING MATERIALS,
Atomics International, Canoga Park, Calif.
D. S. Cowgill, N. F. Davies, and W. J. Kurzeka. 30 Jun 67, 37p
Contract AT (03-3)-701

Descriptors: (*Auxiliary power plants, *Springs), (*Nuclear radiation, *Radiation damage), Performance (Engineering), Fast neutrons.

For abstract, see NSA 21 19.
NAA-SR-11519 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF THE THERMOCHEMICAL BEHAVIOR OF SNAP FUEL MATERIAL IN A HYPERTHERMAL WIND TUNNEL,
Atomics International, Canoga Park, Calif.
J. E. Arnold, and A. W. Barsell. 20 Jun 67, 159p
Contract AT (04-3)-701

Descriptors: (*Auxiliary power plants, Reactor fuels), (*Reactor materials, Wind tunnels), Thermochemistry.

For abstract, see NSA 21 19.
NAA-SR-12082 HC$3.00 MF$0.65

X-RAY DIFFRACTOMETRY TECHNIQUES FOR CERAMIC FUELS.
United Kingdom Atomic Energy Authority, Dounreay (Scotland). Experimental Reactor Establishment.
W. B. Bremner, and D. B. White. 5 Aug 66, 12p
TRG-1309/D/

Descriptors: *Ceramic fuel, *Diffractometer, *X-ray diffraction, Argon, Carbon, Ceramic, Compound, Diffraction, Dioxide, Fuel, Mounting, Nitrogen, Plutonium, Reactor, Reactor fuel, Uranium, X-ray.

For abstract, see STAR 05 21.
N67-36487 HC$3.00 MF$0.65

MOLTEN-SALT REACTOR PROGRAM SEMI-ANNUAL PROGRESS REPORT FOR PERIOD ENDING FEBRUARY 28, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 19.
ORNL-4119 HC$3.00 MF$0.65

TERRESTRIAL LOW-POWER REACTOR PROGRAM QUARTERLY PROGRESS REPORT FOR PERIOD ENDING MARCH 31, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 19.
ORNL-4136 HC$3.00 MF$0.65

URANIUM HEXAFLUORIDE SPECIFICATIONS STUDIES.
Oak Ridge Operations Office (AEC), Tenn.
12 Jul 67, 41p
An AEC program status report.

Descriptors: (*Uranium compounds, Fluorides), Specifications, Reactor fuels, Fuel burn up, Power reactors, Impurities.

For abstract, see NSA 21 19.
ORO-656 HC$3.00 MF$0.65

PROCESS VESSEL CALIBRATION, A TOOL FOR CONTROLLING MATERIAL UNACCOUNTED FOR (MUF),
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
L. W. Doher. 12 Jun 67, 8p
Contract AT (29-1)-1106

Descriptors: (*Tanks (Containers), Calibration), (*Reactor materials, Recovery), Digital computers, Computer programs, Curve fitting.

For abstract, see NSA 21 19.
RFP-858 HC$3.00 MF$0.65

THEORETICAL STUDIES OF THE RE-ENTRY OF PLUTONIUM FUEL,
General Electric Co., Philadelphia, Pa. Missile and Space Div.
L. M. Gilbert, R. Liner, and S. M. Scala. Jun 67, 130p
Contract AT (29-1)-789

Descriptors: (*Reactor fuels, *Plutonium), (*Atmosphere entry, *Auxiliary power plants), Stagnation point, Particles, Melting, Stability.

For abstract, see NSA 21 19.
SC-CR-67-2573 HC$3.00 MF$0.65

18K. Reactor Physics

A SOURCE-ANGLE INTEGRATION PROGRAM FOR THE NGM CODE OUTPUT,
Army Nuclear Defense Lab Edgewood Arsenal Md
Vincent S. Verneuil, Jr. Sep 67, 54p Rept no.
NDL-TM-38

Descriptors: (*Neutron flux, Computer programs), Digital computers, Integration, Monte Carlo method, Neutron transport theory, Gamma-neutron reactions.
Identifiers: Source-angle integration program.

This source angle Integration program is one of a group of programs written at the US Army Nuclear Defense Laboratory to sort and merge the massive amounts of data produced by the Neutron Gamma Monte Carlo (NGM) code of the Los Alamos Scientific Laboratory. The output of this NGM code describes radiation flux at certain detector points as a function of source energy, the solid angle through which the radiation left the source, the time the radiation reached the detector, the energy of the radiation at the detector, and the solid angle through which it entered the detector. This source angle integration program is written in GE's General Assembly Program Language for the GE 225 digital computer with 16K core storage and 6 magnetic tape drives. The program integrates over source solid angle and automatically adjusts the fluxes so that the output will be in the form of neutron flux per source neutron. The flux from the solid angles can be multiplied by weighting functions for an asymmetric source. The output of this program is on magnetic tape in a format compatible with the other programs in this series. (Author)
AD-658 671 HC$3.00 MF$0.65

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON FAST CRITICAL EXPERIMENTS AND THEIR ANALYSIS HELD AT ARGONNE NATIONAL LABORATORY, ILLINOIS, OCTOBER 10-13, 1966.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
ANL-7320 HC$3.00 MF$0.65

PLUTONIUM ABSTRACTS. VOLUME 7, NUMBER 5,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
BNWL-486-Vol-7-No-5 HC$3.00 MF$0.65

ARIADNE-1 A BURNUP PERTURBATION CODE,
Atomics International, Canoga Park, Calif.
E. U. Vaughan, and R. F. Berland. 30 Jun 67, 41p
Contract AT (04-3)-701

Descriptors: (*Perturbation theory, *Multiplication factor), (*Fuel burn up, Computer programs), Reactor lattice parameters.

For abstract, see NSA 21 19.
NAA-SR-12376 HC$3.00 MF$0.65

A DIGITAL COMPUTER PROGRAM FOR CALCULATING STEADY TEMPERATURE AND DENSITY DISTRIBUTIONS IN A GAS CONTAINING HEAT SOURCES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
H. W. Davison. Sep 67, 42p NASA-TN-D-4135
Contract 122-28-02-04-22

Descriptors: *Computer program, *Gas heating, *Heat transfer, *Neutron flux, Axial, Calculation, Computer, Conductivity, Density, Distribution, Flux, Gas, Heat, Neutron, Nuclear, Program, Reactor, Technology, Temperature, Thermal, Transfer.

For abstract, see STAR 05 21.
N67-35762 HC$3.00 MF$0.65

MEASUREMENTS AND SINGLE-VELOCITY CALCULATIONS OF DIFFERENTIAL ANGULAR THERMAL-NEUTRON ALBEDOS FOR CONCRETE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 19.
ORNL-4090 HC$3.00 MF$0.65

18L. Reactors (Power)

EXPERIMENTAL INVESTIGATION OF THE THERMOCHEMICAL BEHAVIOR OF SNAP FUEL MATERIAL IN A HYPERTHERMAL WIND TUNNEL,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 19.
NAA-SR-12082 HC$3.00 MF$0.65

MEASUREMENTS OF THE REACTIVITY PROPERTIES OF THE AGESTA NUCLEAR POWER REACTOR AT ZERO POWER.
Aktiebolaget Atomenergi, Stockholm (Sweden).
G. Bernander. Jul 67, 44p AE-289

Descriptors: *Nuclear power, *Reactor technology, *Zero power reactor (zpr), Computer, Control, Core, Differential, Fuel, Measurement, Nuclear, Power, Program, Property, Reactivity, Reactor, Rod, Technology, Temperature, Zero, Zpr.

For abstract, see STAR 05 21.
N67-35780 HC$3.00 MF$0.65

TERRESTRIAL LOW-POWER REACTOR PROGRAM QUARTERLY PROGRESS REPORT FOR PERIOD ENDING MARCH 31, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 19.
ORNL-4136 HC$3.00 MF$0.65

18N. SNAP Technology

DEVELOPMENT OF 60 CO CAPSULES FOR HEAT SOURCES,
du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 19.
DP-1096 HC$3.00 MF$0.65

ANALYSIS OF SNAPTRAN-1 AND -2 REACTOR KINETICS EXPERIMENTS,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
NAA-SR-11850 HC$3.00 MF$0.65

SNAP REACTOR ABLATION DISINTEGRATION EXPERIMENT (RADE) IN A HYPERTHERMAL WIND TUNNEL,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
NAA-SR-12382 HC$3.00 MF$0.65

EVALUATION OF SNAP REACTOR DISPOSAL TECHNIQUES,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 19.
NAA-SR-12433 HC$3.00 MF$0.65

ANALYSIS OF SNAPTRAN-3 DESTRUCTIVE EXPERIMENT,
Atomics International, Canoga Park, Calif.
W. A. Rhoades. 31 Mar 67, 5p
Contract AT (04-3)-701

Descriptors: (* Auxiliary power plants, * Temperature coefficient of reactivity), (* Reactor lattice parameters, Predictions), Reactor kinetics, Reactor operation.

For abstract, see NSA 21 19.
NAA-SR-9780-ADD-1 HC$3.00 MF$0.65

CONDITIONING AND STEADY-STATE PEFORMANCE OF SNAP-8 TUBE-IN-SHELL MERCURY BOILER.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. A. Albers, S. H. Gorland, and W. T. Wintucky.
Sep 67, 47p NASA-TM-X-1441
Contract 701-04-00-02-22

Descriptors: * Boiler, * Mercury (metal), * Snap-8, * Steady state, Conditioning, Flow, Heat transfer, Operation, Performance, Potassium, Rate, Shell, Sodium, Tube.

For abstract, see STAR 05 21.
N67-35615 HC$3.00 MF$0.65

INSTRUMENTATION AND CONTROLS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 1, 1966.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 19.
ORNL-4091 HC$3.00 MF$0.65

TERRESTRIAL LOW-POWER REACTOR PROGRAM QUARTERLY PROGRESS REPORT FOR PERIOD ENDING MARCH 31, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 19.
ORNL-4136 HC$3.00 MF$0.65

THEORETICAL STUDIES OF THE RE-ENTRY OF PLUTONIUM FUEL,
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 19.
SC-CR-67-2573 HC$3.00 MF$0.65

INVESTIGATION OF THE ABLATION OF SMALL PARTICLES UPON SIMULATED RE-ENTRY.
TRW Systems, Redondo Beach, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see NSA 21 19.
SC-CR-67-2583 HC$3.00 MF$0.65

19. ORDNANCE

19A. Ammunition, Explosives, and Pyrotechnics

ARTILLERY GLOSSARY. ENGLISH-VIETNAMESE, VIETNAMESE-ENGLISH. FIRST EDITION (Tu Dien Phao Binh. Anh-Viet, Viet-Anh. Xuat Ban Lan Thu Nhat).
Military Assistance Command Vietnam San Francisco Calif 96222 Training Aids Div
For primary bibliographic entry see Field 5B.
AD-658 665 HC$3.00 MF$0.65

THEORETICAL OPTIMIZATION OF CARTRIDGE ACTUATED DEVICES.
Technical memo.,
Naval Weapons Lab Dahlgren Va
S. E. Hedden. Oct 59, 23p Rept no. NWL-TM-W-22/59

Descriptors: (* Cartridges (PAD), Optimization), Force (Mechanics), Acceleration, Kinetic energy, Theory.

The examples considered here are sufficient to illustrate the analytical approach to the optimization of cartridge actuated devices and to show that the method is capable of predicting the gains in size and weight reductions which can be expected from optimization in specific devices. In general terms we see that: (1) definite minima in size and/or weight may exist in some cases, while in others there are no practical minima; (2) minimum weight and size may or may not occur at the same operating pressure; and (3) there may be considerable latitude in selecting the operating pressure while yet having the device near optimum in size and/or weight. The analytical approach promises to be an effective tool in the optimization of cartridge actuated devices. (Author)
AD-658 731 HC$3.00 MF$0.65

19C. Combat Vehicles

CONTROL OF GUN FUMES IN M-4 SERIES MEDIUM TANKS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 551 HC$3.00 MF$0.65

DETERMINATION OF BASIC VENTILATION CHARACTERISTICS OF TANKS OF THE M4 SERIES. DETERMINATION OF BASIC VENTILATION CHARACTERISTICS OF TANKS OF THE M5 SERIES.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 552 HC$3.00 MF$0.65

VENTILATION REQUIREMENTS FOR GAS-PROOFING THE M-5 TANK,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 553 HC$3.00 MF$0.65

IMPROVEMENT IN DRIVER'S VISION IN TANKS.
Rept. no. 5,
Army Medical Research Lab Fort Knox Ky
F. W. Fisk. 7 Sep 44, 5p
Rept. on prop. 'Vision in Tanks' and 'Characteristics and Limitations of Present Visual Devices in Tanks'.

Descriptors: (* Tanks (Combat vehicles), * Vision), Personnel, Rotation, Periscopes, Optical equipment.

The purpose of the report is to indicate a method for improving driver's vision in tanks. Means for more practical utilization of available vertical field of vision through tank driver's periscope is desired. Recommendations are made that a spring device similar to that described in the Appendix be developed as a field fix on present vehicles to permit the driver to rotate his periscope on its axis by head pressure alone. (Author)
AD-658 554 HC$3.00 MF$0.65

CONTROL OF GUN FUMES IN M4 SERIES MEDIUM TANKS BY POSITIVE-PRESSURE VENTILATION.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 555 HC$3.00 MF$0.65

ADEQUATE HEAD ROOM IN TANKS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 561 HC$3.00 MF$0.65

TELESCOPIC SIGHTS T-106-E1 AND M-71-F IN COMPARISON WITH OTHER TANK SIGHTS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 19E.
AD-658 564 HC$3.00 MF$0.65

VISUAL REQUIREMENTS FOR SPOTTING,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 17H.
AD-658 566 HC$3.00 MF$0.65

DRIVER'S VISION IN LANDING VEHICLE TRACTOR.
Rept. no. 4,
Army Medical Research Lab Fort Knox Ky
F. S. Brackett. 9 Mar 44, 24p
Rept. on projs. 'Vision in Tanks' and 'Study of Characteristics and Limitations of Present Visual Devices'.

Descriptors: (* Amphibious vehicles, * Vision), Hatches, Periscopes, Water, Protection, Fire safety.

The purpose of the report is to determine characteristics and limitations in subject vehicles and indicate steps for improvement. Most crucial need is for improved driver's vision. It is now necessary for him to make three distinct changes as to means of vision during the most crucial moments in landing the craft as follows: At the outset, he drives with the hatch open, seat up and head out. He then lowers seat and opens forward hatch, closes overhead hatch, tilting periscope out of the way so that he can get the maximum of the remaining unobstructed vision. He closes forward hatch and adjusts the periscope so that he retains that small field of view during the remainder and most crucial steps of the operation. It is exactly during this time that the craft is in the greatest danger of broaching or being turned end over end as a result of momentary loss of power or steering. It is believed that a large proportion of the losses, which in battle have amounted to as much as 50% of the landing craft, occur as a result of the distraction caused by the effort to retain adequate vision and from lack of vision. (Author)
AD-658 567 HC$3.00 MF$0.65

CARBON MONOXIDE HAZARD FROM EXHAUST GASES IN TANKS THAT ARE IN TOW.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 568 HC$3.00 MF$0.65

DISCUSSION OF VENTILATION REQUIREMENTS OF ARMORED VEHICLES,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 569 HC$3.00 MF$0.65

TEST OF CARBON MONOXIDE HAZARD FROM ENGINE IN LIGHT TANK, M24,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 570 HC$3.00 MF$0.65

VENTILATION REQUIREMENTS FOR GAS-PROOFING TANKS OF THE M-4 SERIES,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 571 HC$3.00 MF$0.65

PROTECTION OF PERSONNEL IN TANKS AGAINST TOXIC AGENTS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 573 HC$3.00 MF$0.65

DETERMINATION OF THE CHARACTERISTICS AND EFFECTS UPON THE CREW OF GUN FUMES FROM FIRING OF THE WEAPONS IN THE M4A4E1 TANK.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6T.
AD-658 574 HC$3.00 MF$0.65

DETERMINATION OF THE CHARACTERISTICS AND EFFECTS UPON THE CREW OF GUN FUMES FROM FIRING OF THE WEAPONS IN THE M7 TANK.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6T.
AD-658 575 HC$3.00 MF$0.65

TOXIC GASES IN ARMORED VEHICLES. DETERMINATION OF VENTILATION REQUIREMENTS FOR GAS-PROOFING TANKS OF THE M4 SERIES.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 576 HC$3.00 MF$0.65

TEST OF TELESCOPES T122 AND T123.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 19E.
AD-658 578 HC$3.00 MF$0.65

REPORT ON WILD HEERBRUGG RANGEFINDER, 80cm BASE, 1944.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 579 HC$3.00 MF$0.65

VISION IN TANKS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 17H.
AD-658 580 HC$3.00 MF$0.65

VISUAL REQUIREMENTS, CHARACTERISTICS AND LIMITATIONS OF PRESENT VISUAL DEVICES IN TANKS AND MEANS FOR IMPROVING SIGHTING TELESCOPES AND PERISCOPES,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 17H.
AD-658 581 HC$3.00 MF$0.65

STUDY OF ERRORS IN RANGE ESTIMATION WITH THE UNAIDED EYE,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 17H.
AD-658 582 HC$3.00 MF$0.65

REPORT ON PERISCOPIC SIGHT T8 AND MOUNT T105,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 584 HC$3.00 MF$0.65

PARTIAL REPORT ON THE USE OF RED LIGHT FOR MAINTAINING DARK ADAPTATION IN TANKS,
Army Medical Research Lab Fort Knox Ky
L. B. Roberts, and L. W. Eichna. 5 Dec 42, 12p
Rept. on proj. 'Determination of the Type of Illuminating Least Disturbing to Dark Adaptation in Tanks' and 'Investigation of Methods of Improving Night Vision in Tank Crews by the use of Eye Appliances'.

Descriptors: (*Tanks (Combat vehicles), Lighting equipment), Night vision, Optical filters, Personnel, Efficiency, Design, Eyeglasses, Illumination.

The purpose of the report is to investigate the effect of filtered red light on the dark adaptation of tank crews and to determine the adequacy of the illumination provided. The present interior illumination in M-4 tanks causes loss of dark adaptation and lowers the efficiency of night vision. Filtered red light of the characteristics specified is superior to the present lighting in preserving dark adaptation. Recommendations made are that ten M-4 medium tanks be equipped with red filters and these tanks be used in night problems by a field unit to determine the adequacy of lighting under a variety of conditions. (Author)
AD-658 586 HC$3.00 MF$0.65

DETERMINATION OF THE LIGHTING REQUIREMENTS FOR VARIOUS TASKS OF TANK CREWS,
Army Medical Research Lab Fort Knox Ky
Lester B. Roberts, and Wendell E. Mann. 5 Aug 43, 10p
Rept. on proj. 'Night Visions from Tanks'.

Descriptors: (*Tanks (Combat vehicles), *Night vision), Efficiency, Personnel, Illumination, Design, Intensity, Lighting equipment.

The purpose of the report is to develop, in a usable form, the requirements for interior tank lighting arising from a consideration of the factors which determine efficiency of crew vision under day and night operating conditions. (Author)
AD-658 587 HC$3.00 MF$0.65

PHYSIOLOGICAL AND OPERATIONAL CHARACTERISTICS OF T26E3 TANK,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 593 HC$3.00 MF$0.65

OPERATIONAL AND PHYSIOLOGICAL CHARACTERISTICS OF THE TANK T26E3, (M26).
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 594 HC$3.00 MF$0.65

PHYSIOLOGICAL CHARACTERISTICS OF THE T25E1-T26E1 TANK. CONTROL OF GUN FUME HAZARD,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 596 HC$3.00 MF$0.65

CARBON MONOXIDE HAZARD FROM AUXILIARY GENERATORS IN TANKS,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 600 HC$3.00 MF$0.65

MANUAL TRAVERSING EFFORT IN TANKS,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 624 HC$3.00 MF$0.65

TEST OF NON-SKID PAINT ON TANKS,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 11C.
AD-658 626 HC$3.00 MF$0.65

EFFECT OF EXPOSURE TO TANK NOISE UPON HEARING ACUITY OF TANK CREWS,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6E.
AD-658 629 HC$3.00 MF$0.65

PHYSIOLOGICAL AND OPERATIONAL CHARACTERISTICS OF TANK T25E1.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 630 HC$3.00 MF$0.65

PLACEMENT AND MOUNTING OF SIGHTS IN TANKS,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 19E.
AD-658 634 HC$3.00 MF$0.65

STUDY OF CHARACTERISTICS AND LIMITATIONS OF PRESENT VISUAL DEVICES IN TANKS. STUDY OF MEANS OF IMPROVING SIGHTING TELESCOPES,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 19E.
AD-658 635 HC$3.00 MF$0.65

REPORT ON GUN FUME HAZARD FROM 37Mm GUN IN M5 LIGHT TANK,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 636 HC$3.00 MF$0.65

CARBON MONOXIDE HAZARD FROM AUXILIARY GENERATORS IN TANKS,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 637 HC$3.00 MF$0.65

TOXIC GASES IN ARMORED VEHICLES. DETERMINATION OF THE CHARACTERISTICS AND EFFECTS UPON THE CREW OF GUN FUMES FROM FIRING OF THE WEAPONS IN TANKS OF THE M5 SERIES.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 13L.
AD-658 638 HC$3.00 MF$0.65

ANALYSIS OF PHYSIOLOGICAL CHARACTERISTICS OF T9E1 TANK,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 640 HC$3.00 MF$0.65

PHYSIOLOGICAL AND OPERATIONAL CHARACTERISTICS OF M-24 TANK.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 641 HC$3.00 MF$0.65

PHYSIOLOGICAL CHARACTERISTICS OF T23 TANK.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 643 HC$3.00 MF$0.65

19D. Explosions, Ballistics, and Armor

EVALUATION OF CONCEPTS FOR MEASURING DIMENSIONS OF BUBBLES PRODUCED BY UNDERWATER EXPLOSIONS,
National Marine Consultants Anaheim Calif
George F. Beardsley, Jr., Donald R. Bellows, and

Richard Kent. Jun 63, 57p Rept no. NMC-ONR-63
Contract Nonr-3678 (00)

Descriptors: (*Underwater explosions, Test methods), (*Explosion bubbles, Measurement), Photographic analysis, Acoustics, Probes (Electromagnetic), Electrical conductance, Kinematics, Feasibility studies.

This report discusses the feasibility of several methods which have been proposed for obtaining measurements of the radius of bubbles resulting from underwater explosions of yields ranging from 1 to 20 tons of TNT. The methods considered are: (1) Photographic, (2) Acoustic, (3) Probe conductivity, (4) Electrical conductivity, (5) Field kinematics. For the yields considered, the photographic and acoustical methods are shown to be of little or no use, whereas the remaining three methods look promising in varying degrees. (Author)
AD-658 543 HC$3.00 MF$0.65

FORMATION OF CAVITIES AND MICROJETS IN LIQUIDS AND THEIR ROLE IN INITIATION AND GROWTH OF EXPLOSION.
Revision ed.,
Cambridge Univ (England) Cavendish Lab
F. P. Bowden, and M. P. McOnie. 28 Sep 66, 22p
AFOSR-67-2230
Grant AF-EOAR-03-67
Revision of manuscript submitted 14 Jun 66.
Availability: Published in Proceedings of the Royal Society v298 p38-50 1967.

Descriptors: (*Cavitation, *Explosions), (*Liquid jets, Explosions), Bubbles, Combustion, Liquids, Impact shock, Great Britain.

It is shown that micro Munroe jets can be formed at the surface of a gas bubble which has been trapped in the liquid explosive between two impacting surfaces and is being rapidly compressed. As the compression continues these jets are projected at high speed into the gas. Similar jets can be produced between two drops of explosive which are coalescing during impact. These jets may facilitate the initiation of burning both by increasing the impact velocity of the liquid and by dispersing the liquid within a pocket of compressed and heated gas. The reaction grows first as an accelerating burning. The pressure developed in this burning zone has, in the early stages, the effect of closing up and removing any cavities which may exist in the explosive directly ahead of the flame front, so that the reaction advances into a homogeneous zone of liquid that is free from discontinuities. It is not until the comparatively slow burning breaks through the homogeneous high pressure zone, and reaches a zone of liquid containing numerous cavities and bubbles, that the burning is able to transform quickly into a much faster and more violent explosion. The discontinuities are then able to sustain the rapid propagation of explosion. The bubbles of gas or cavities that are formed by the precursor waves create an environment which is conducive to the rapid transition from burning to explosion. (Author)
AD-658 958 Not available from CFSTI.

METHODS FOR INSTALLING THE IBL MINIATURE PRESSURE GAGE.
Technical note,
Ballistic Research Labs Aberdeen Proving Ground Md
Emerson V. Clarke, Jr., and Robert W. Deas. Aug 67, 24p Rept no. BRL-TN-1662

Descriptors: (*Pressure gages, Interior ballistics), Mechanical drawings, Installation, Guns, Cartridge cases, Gun barrels.

The detailed drawings in this report specify the required modifications to cartridge cases and gun tube walls to allow installation of IBL Miniature Pressure Gages. Additional information is included in the descriptive text to provide instructions for the assembly and installation of components. Recommendations are made which must be followed to make precise measurements with these gages. (Author)
AD-658 999 HC$3.00 MF$0.65

FORTRAN BKW A CODE FOR COMPUTING THE DETONATION PROPERTIES OF EXPLOSIVES,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18C.
For abstract, see NSA 21 19.
LA-3704 HC$3.00 MF$0.65

THE INTERACTION OF A LONG DURATION FRIEDLANDER SHAPED BLAST WAVE WITH AN INFINITELY LONG RIGHT CIRCULAR CYLINDER. INCIDENT BLAST WAVE 20.7 PSI, POSITIVE DURATION 50 MS AND A 16 CM DIAMETER CYLINDER.
Atomic Weapons Research Establishment, Aldermaston (England).
For primary bibliographic entry see Field 18C.
For abstract, see STAR 05 21.
N67-35632 HC$3.00 MF$0.65

19E. Fire Control and Bombing Systems

TELESCOPIC SIGHTS T-106-E1 AND M-71-F IN COMPARISON WITH OTHER TANK SIGHTS.
Rept. no. 3.
Army Medical Research Lab Fort Knox Ky
23 Feb 44, 9p

Descriptors: (*Telescopic gun sights, *Tanks (Combat vehicles)), Velocity, Design, Weapons, Vision, Human engineering, Analysis, Howitzers.

The purpose of the report is to evaluate subject sights and to determine the useful scope of employment. Recommendations made are that T-106-E1 employed with low velocity weapons especially 105 mm Howitzer, where provision is made for mounting the large straight sight. A three power sight of the periscopic offset type requiring less eye travel is desirable, however, and should be developed. Sight T-106 be employed as a secondary fire control unit in conjunction with higher power sights for high velocity weapons. The employment of M-71 series sight be restricted to high velocity weapons requiring higher power sight than now available and not necessitating a large field of good definition. (When periscope sight M-10 is available, there will be no need of combined employment in tanks for this sight (M-71) as it is not suitable as a secondary fire control unit.) (Author)
AD-658 564 HC$3.00 MF$0.65

LATERAL-OFFSET SIGHT.
Rept. no. 3,
Army Medical Research Lab Fort Knox Ky
Frederick S. Brackett. 27 Sep 43, 36p
Rept. on projs. 'Vision in Tanks' and 'Study of Means for Improving Sighting Telescopes.'

Descriptors: (*Gun sights, Design), Optical properties, Gun smoke, Velocity, Howitzers, Weapons, Mortars.

The purpose of the report is to provide a sight especially suitable for guns of 76 mm bore and larger, and also for low velocity weapons. (Author)
AD-658 565 HC$3.00 MF$0.65

TEST OF TELESCOPES T122 AND T123.
Army Medical Research Lab Fort Knox Ky
7 Sep 44, 3p

Descriptors: (*Telescopic gun sights, Armored vehicles), Performance (Engineering), Effectiveness.

The continuously variable telescopic sight T122 was found to be a good sight, especially in the range of 4 to 5 power and that the higher magnification will be found useful in laying higher velocity weapons. The T123 does not offer sufficient advantages to justify its manufacture. The T122 is inferior to the prismatic sights T8 and M10 but can be advantageously used with the T8 or M10 as a supplementary or reserve sight.
AD-658 578 HC$3.00 MF$0.65

REPORT ON PERISCOPIC SIGHT T8 AND MOUNT T105,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 584 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 590 HC$3.00 MF$0.65

MANUAL TRAVERSING EFFORT IN TANKS,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 624 HC$3.00 MF$0.65

PLACEMENT AND MOUNTING OF SIGHTS IN TANKS,
Army Medical Research Lab Fort Knox Ky
F. S. Brackett. 9 Jun 43, 11p
Rept. on proj. 'Vision in Tanks'.

Descriptors: (*Tanks (Combat vehicles), *Periscopic gun sights), (*Telescopic gun sights, Tanks (Combat vehicles)), Fire control systems, Alignment, Vision, Machine guns, Accuracy, Vision, Human engineering.

The purpose of the report is to improve fire control in armored vehicles by better placement and mounting of sights. Fire control in tanks now employs both the periscopic and the coaxial sights. The periscope provides general vision and a low power sight for proximate and moving fire, whereas the coaxial telescopic sight, of higher power is employed for shooting at distant targets. It is essential that both sights be so located that the gunner can shift quickly from one to the other. A dual periscopic sight (T8) has been designed to replace the present gunner's periscope. T8 will provide, in addition to general vision, a unit-power sight for proximate shooting and shooting while moving, and a 6 power sight having the optimal properties required for shooting at greater distance. The 3 power coaxial telescope will then be a reserve or compromise sight to serve all purposes, in the event of loss of the periscope. (Author)
AD-658 634 HC$3.00 MF$0.65

STUDY OF CHARACTERISTICS AND LIMITATIONS OF PRESENT VISUAL DEVICES IN TANKS. STUDY OF MEANS OF IMPROVING SIGHTING TELESCOPES,
Army Medical Research Lab Fort Knox Ky
F. S. Brackett. 28 Dec 43, 21p Rept no. 2

Descriptors: (*Telescopic gun sights, *Tanks (Combat vehicles)), Optical images, Lenses, Prisms (Optics), Design, Performance (Engineering).

The purpose of the report is to establish criteria for the selection of sight design and for the control of sight production. Proposals were made to improve the conventional telescopic sights which employ lenses for the erection of the image. To develop prism erecting sights, because of their in-

herently superior optical properties and their advantages in ballistic treatment. The development of prism erecting sights has resulted in the M10 (or T8) dual periscopic sight and some progress has been made in the development of a lateral offset sight. It is the purpose of this report to evaluate the progress in improvement of straight tube sights, in terms of criteria which refer particularly to the requirements of the using arm. (Author)
AD-658 635 HC$3.00 MF$0.65

19F. Guns

PARALLELOGRAM MOUNTING OF REFLEX SIGHT FOR O CAL. ANTI-AIRCRAFT MACHINE GUN,
Army Medical Research Lab Fort Knox Ky
F. S. Brackett. 14 Oct 44, 41p
Rept. on projs. 'Vision in Tanks' and Study and Development of New Instruments for Indirect Fire Control.

Descriptors: (*Gun mounts, *Antiaircraft guns), Alignment, Design, Effectiveness, Gun smoke, Recoil mechanisms.

The purpose of the report is to develop a mount which would place the reflex sight above the smoke, be convenient to the gunner, and absorb recoil shock. (Author)
AD-658 585 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 588 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 589 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 591 HC$3.00 MF$0.65

STUDY OF ERRORS IN FIELD ARTILLERY PRACTICE.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 592 HC$3.00 MF$0.65

DETERMINATION OF THE SOURCES, MAGNETUDE AND COSTS OF GUNNERY ERRORS,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 598 HC$3.00 MF$0.65

SUGGESTED MODIFICATIONS IN THE TURRET OF THE M5A1 TANK TO IMPROVE GUNNER-COMMANDER'S POSITION, USE OF SIGHTS AND OPERATION OF CONTROL,
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 639 HC$3.00 MF$0.65

ARTILLERY GLOSSARY. ENGLISH-VIETNAMESE, VIETNAMESE-ENGLISH. FIRST EDITION (Tu Dien Phao Binh. Anh-Viet, Viet-Anh. Xuat Ban Lan Thu Nhat).
Military Assistance Command Vietnam San Francisco Calif 96222 Training Aids Div
For primary bibliographic entry see Field 5B.
AD-658 665 HC$3.00 MF$0.65

SURFACE CHEMICAL DISPLACEMENT OF WATER AND/OR OIL FROM WEAPONS SUBSTRATES.
Army Weapons Command Rock Island Ill Research and Engineering Div
For primary bibliographic entry see Field 11K.
AD-658 985 HC$3.00 MF$0.65

20. PHYSICS

20A. Acoustics

EVALUATION OF NOISE PROBLEMS ANTICIPATED WITH FUTURE VTOL AIRCRAFT.
Technical rept.,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
John N. Cole, and Robert T. England. May 67, 24p Rept no. AMRL-TR-66-245

Descriptors: (*Vertical take-off planes, Noise), (*Airplane engine noise, Vertical take-off planes), Propulsion, Take-off, Aircraft landings, Airports, Detection, Design.
Identifiers: Evaluation.

The potential noise problems anticipated with future VTOL aircraft are analyzed and discussed in general terms, and a brief review of the basic principles of noise generation of various types of propulsion systems proposed for VTOL is included. Primary consideration is given to the noise environments produced in areas adjacent to VTOL sites, since they could cause the most serious noise problem limiting the usefulness of VTOL aircraft. Contours of perceived noise levels are compared for different takeoff and landing profiles of 3-4 passenger, 60 passenger, and 25 ton-lift-crane VTOL aircraft. Criteria and methods for assessing the response of communities to noise from V-port operations are discussed along with the problem of detection of military VTOL aircraft by means of noise. Recommendations are given on the requirements for future research on these noise problems with emphasis on the need for considering noise as an integral part of the design, selection, and test of VTOL aircraft. (Author)
AD-658 448 HC$3.00 MF$0.65

EXPLORATORY RESEARCH OF MAGNETIC MATERIALS BY ULTRASONIC TECHNIQUES.
Colorado Univ Boulder
For primary bibliographic entry see Field 20C.
AD-658 467 HC$3.00 MF$0.65

OBSERVATIONS OF THE SOUND FIELD IN THE DEEP SEA,
Naval Ordnance Lab White Oak Md
Robert J. Urick. 16 Jun 67, 34p Rept no. NOLTR-67-103

Descriptors: (*Underwater sound, Propagation), Deep water, Acoustic ranges, Underwater sound signals, Frequency, Hydrophones.

The acoustic structure of the deep sea at ranges out to 110 miles was examined at different ranges, depths and frequencies by means of explosive charges dropped from an aircraft and recorded by a deep ship-borne hydrophone. The expected sequence of convergence half-zones was obtained, even at frequencies as low as the 25-100 Hz band. At all frequencies better transmission was found when both source and receiver lie well within the deep sound channel. (Author)
AD-658 718 HC$3.00 MF$0.65

CATEGORY SCALING JUDGMENT TESTS ON MOTOR VEHICLE AND AIRCRAFT NOISE.
Bolt Beranek and Newman Inc Van Nuys Calif
For primary bibliographic entry see Field 5J.
AD-658 755 HC$3.00 MF$0.65

ADVANCEMENT OF ULTRASONIC TECHNIQUES USING RERADIATED SOUND ENERGIES FOR NONDESTRUCTIVE EVALUATION OF WELDMENTS.
Automation Industries Inc Boulder Colo Research Div
For primary bibliographic entry see Field 13H.
AD-659 033 HC$3.00 MF$0.65

ON THE PROPAGATION OF A WEAK PRESSURE WAVE AT VERY LOW PRESSURE.
Research paper,
Institute for Defense Analyses Arlington Va Science and Technology Div
Joshua Menkes, and Julius L. Jackson. Sep 67, 27p Rept no. RP-P-328
IDA/HQ-67-6045
Contract DAHC15-67-C-0011

Descriptors: (*Sound, Propagation), Equations of motion, Numerical analysis, Mechanical waves, Low pressure research.

The propagation of a pressure-step discontinuity in an attenuating and dispersive medium is analyzed in the acoustic approximation. An exact solution is obtained, valid for all times and all distances. Approximate solutions for very short times and asymptotically large times are also presented. The range of validity of these approximations is indicated. The presence of an acoustic precursor signal, demonstrated by the exact solution only, appears to be a novel result. (Author)
AD-659 041 HC$3.00 MF$0.65

SOUND SCATTERING BY ELASTIC CYLINDERS.
Underwater Acoustics Program,
Catholic Univ of America Washington D C
R. D. Doolittle, H. Uberall, and P. Ugincius.
1967, 54p Rept no. 1-67
Contract Nonr-2249 (08)

Descriptors: (*Sound, Scattering), Cylindrical bodies, Elastic shells, Rayleigh waves, Velocity, Equations of motion.

The problem of steady-state sound scattering by an infinite elastic circular cylinder is treated by performing a Sommerfeld-Watson transformation on the normal-mode series. The complex velocities of the ensuing circumferential waves are found by obtaining zeroes of a 3 x 3 determinant in the complex plane, identical to that used by Goodman and Grace in the theory of free vibrations of an elastic cylinder. We find numerically two kinds of zeroes: (Alpha) Franz-type zeroes, similar to (and for aluminum cylinders, almost identical with) those appearing in scattering from rigid cylinders; (Beta) Rayleigh-type zeroes, as found by Goodman and Grace, which for large cylinders tend to the Rayleigh and Stoneley wave velocities, and which enter the cylinder surface at a certain critical angle. These two types correspond to the 'diffracted' and the ordinary surface waves conjectured by Keller and Karal. We also consider the causality relations of sound pulses and show mathematically that they lead to arrival times in accord with the (complex) ray paths of Keller's theory. Finally, the trajectories of the zeroes in the complex plane for variations of ka, and the group velocities of circumferential sound pulses have been obtained. (Author)
AD-659 047 HC$3.00 MF$0.65

SUPERSONIC TRANSPORT AIRPORT AND COMMUNITY JET NOISE DURING TAKEOFF AND INITIAL CLIMB.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 21.
N67-35721 HC$3.00 MF$0.65

FAR-FIELD ACOUSTIC ENVIRONMENTAL PREDICTIONS FOR LAUNCH OF SATURN V AND A SATURN V MLV CONFIGURATION.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 22D.
For abstract, see STAR 05 21.
N67-35775 HC$3.00 MF$0.65

SIMILARITY OF FAR NOISE FIELDS OF JETS.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Walton L. Howes. 1960, 48p NASA-TR-R-52
AD-228 470

Descriptors: (*Jets, *Aerodynamic noise), Acoustic properties, Subsonic flow, Supersonic flow, Mathematical analysis, Nozzle gas flow.

Similarity parameters for far-field noise from subsonic and supersonic jets issuing from circular nozzles are derived and tested using experimental data. Relations for the total acoustic power, acoustic-power spectrum, acoustic directivity, local mean-square-pressure spectrum, and acoustic-pressure probability-density are considered. Subsonic data correlated well in all respects. With the exception of total-power similarity, supersonic data also correlated well. Subsonic and supersonic correlations generally differed only slightly. (Author)
PB-175 853 HC$3.00 MF$0.65

20B. Crystallography

SINGLE CRYSTAL PEROVSKITES AS ELECTROOPTICALLY ACTIVE MATERIALS.
Quarterly progress rept. no. 3, 1 Jan-1 Apr 67,
Union Carbide Corp Indianapolis Ind Electronics Div
H. Fay. 1 Apr 67, 42p Rept no. SRCR-67-12
Contract AF 33(615)-5410
See also AD-650 411.

Descriptors: (*Perovskites, *Electrooptics), (*Single crystals, Perovskites), (*Crystal growth, Perovskites), Potassium compounds, Tantalum compounds, Niobates, Optical properties, Electrical properties, Lasers, Manufacturing methods, Complex compounds.
Identifiers: Potassium tantalate niobate.

The Czochralski growth of KTN was continued in order to determine reproducibility. In addition, a new growth technique was tested. Thirteen perovskite compounds were selected from the computer output data for melt studies on the strip heater. Twelve of the best KTN crystals were fabricated, etched, and tested for electrooptic properties; one crystal was operated as a switch for a Nd:YAG laser. (Author)
AD-658 461 HC$3.00 MF$0.65

THE CRYSTAL STRUCTURE OF NEODYMIUM MONOTELLUROOXIDE-Nd2O2Te,
Massachusetts Inst of Tech Lexington Lincoln Lab
P. M. Raccah, J. M. Longo, and H. A. Eick. 25 Feb 67, 4p Rept no. JA-2973
ESD-TR-67-504
Contract AF 19(628)-5167
Prepared in cooperation with Michigan State Univ., East Lansing, Dept. of Chemistry.
Availability: Published in Inorganic Chemistry v6 p1471-3 Aug 1967.

Descriptors: (*Neodymium compounds, Crystal structure), (*Tellurium compounds, Crystal structure), Oxides, X-ray diffraction analysis, Symmetry (Crystallography), Magnetic properties, Crystal lattices, Chemical bonds.
Identifiers: Neodymium monotellurooxide.

The crystal structure of Nd2O2Te was determined and refined from powder X-ray diffraction intensity data. The unit cell possesses body-centered tetragonal symmetry with two molecules per unit cell. The lattice parameters are a0 = 4.032 A and c0 = 12.80 A. The three crystallographically independent atoms are located in the following positions of space group 14/mmm: 4 (e) plus or minus (0,0,z),z = 0.341 (Nd); 4 (d) (0,1/4, 1/4; 1/2, 0, 1/4 (O); and 2 (a) (0,0,0) (Te), all plus body-centering translations. One significant feature of this structure is the ninefold coordination exhibited by the lanthanide ion. The magnetic susceptibility measured as a function of temperature gave Mu-eff = 3.62 BM. (Author)
AD-658 765 Not available from CFSTI.

ORGANOMETALLIC SULFUR COMPLEXES. VIII. THE MOLECULAR STRUCTURE OF A DOUBLY SULFUR-BRIDGED DIMERIC COMPLEX OF MOLYBDENUM (V), (C5H5MoO)2S2, CONTAINING A Mo-Mo INTERACTION,
Wisconsin Univ Madison Dept of Chemistry
For primary bibliographic entry see Field 7B.
AD-658 798 Not available from CFSTI.

POLE-FIGURE INVERSION FOR THE TRICLINIC CRYSTAL CLASS. POLYETHYLENE TEREPHTHALATE,
Duke Univ Durham N C Dept of Chemistry
W. R. Krigbaum, and Y. I. Balta. 11 Nov 66, 12p
AROD-3222:8
Grants DA-ARO (D)-31-124-G580, DA-ARO (D)-31-134-G202
Availability: Published in The Journal of Physical Chemistry v71 n6 p1770-9 May 1967.

Descriptors: (*Polyester plastics, *Crystal structure), Fibers (Synthetic), Drawing (Machine processing), Distribution functions, X-ray diffraction analysis.
Identifiers: Polyethylene terephthalite.

The Roe-Krigbaum procedure for determining the crystallite orientation distribution function is applied to four drawn samples of polyethylene terephthalate having fiber texture. This is the first example of pole-figure inversion for a material belonging to the triclinic crystal class. Application of the procedure to this polymer is particularly difficult because the plane-normal distributions are rapidly varying functions containing sharp peaks, and the triclinic system offers no simplification due to symmetry. Seventeen plane normals (all composite) were investigated for each sample. The crystallite orientation distributions obtained are broadened due to unavoidable series termination errors, but useful information can be gained concerning the qualitative aspects of the distributions. Polyethylene terephthalate has a unique preferred crystallite orientation with the fiber axis 6 deg. from the c axis and making an azimuthal angle of approximately 50 deg. with the plane containing the a* and c axes. This orientation is already achieved with considerable perfection at a drawing ratio of 3. (Author)
AD-658 802 Not available from CFSTI.

DYNAMICAL BEHAVIOR OF DISLOCATIONS,
Illinois Univ Urbana
John J. Gilman. Sep 67, 41p
Contract Nonr-3985 (06)
Prepared for presentation at the Symposium on the Mechanical Behavior of Materials under Dynamic Loads, San Antonio, Tex., 1967.

Descriptors: (*Dislocations, Dynamics), Mobility, Measurement, Stresses, Anisotropy, Velocity.

Direct and indirect measurements of dislocation mobilities are reviewed. It is pointed out that no single functional relation between dislocation velocity and stress exists. Four limiting cases are classified schematically: (a) pure metals and salts (b) covalent crystals and impure others; each at low and high stress levels. For cases (a) and (b) at low stress levels linear viscosity is observed. It is pointed out that a previous treatment of the viscous drag by Mason neglects the dominant role of glide plane sliding and a new treatment is presented. For case (b) at high stress levels (low temperatures) flow is stress-activated and a model based on quantum-tunneling is presented and shown to compare favorably with experiments. The behavior of heterogeneous crystals is discussed. A model proposed by Copley and Kear that predicts dynamic anisotropy is reviewed. (Author)
AD-658 874 HC$3.00 MF$0.65

NON-CENTROSYMMETRIC STRUCTURES IN AN M4Yn HEXAGONAL FERRITE SERIES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
J. A. Kohn, and D. W. Eckhart. 15 Jul 66, 8p
Availability: Published in Zeitschrift fuer Kristallographie v124 n1/2 p69-76 1967.

Descriptors: (*Ferrites, *Crystal structure), Zinc compounds, Manganese compounds, Cobalt compounds, X-ray diffraction analysis, Crystal lattices.

Further single-crystal x-ray diffraction studies of flux-grown hexagonal ferrites containing Zn, Zn+Mn, or Co showed a third series of mixed-layer structures, M4Yn, to supplement the earlier MnS and M2Yn groups. The M4Yn series permits non-centrosymmetry; of the nine phases observed, five are non-centric. Stacking sequences were confirmed by 00.1 structure-factor calculations. A nomenclature system for quasi-polytypic mixed-layer structures is discussed. (Author)
AD-658 946 Not available from CFSTI.

ORGANOMETALLIC SULFUR COMPLEXES. IX. STRUCTURE OF A HEXANUCLEAR COBALT CARBONYL SULFUR COMPLEX, (SCo3(CO)7)2S2, CONTAINING A TETRAMETAL-COORDINATED BRIDGING DISULFIDE GROUP,
Wisconsin Univ Madison Dept of Chemistry
For primary bibliographic entry see Field 7B.
AD-658 961 Not available from CFSTI.

THE STRUCTURE OF A TRIGONAL-BIPYRAMIDAL NICKEL (II) CYANIDE COMPLEX CONTAINING THE TETRADENTATE LIGAND TRIS (3-DIMETHYLARSINOPROPYL)PHOSPHINE,
Wisconsin Univ Madison Dept of Chemistry
For primary bibliographic entry see Field 7B.
AD-658 962 Not available from CFSTI.

CRYSTAL STRUCTURAL STUDIES ON SEMICONDUCTIVE MATERIALS.
Pittsburgh Univ Pa
For primary bibliographic entry see Field 20L.
AD-659 002 HC$3.00 MF$0.65

VARIATION IN THE ELASTIC CONSTANTS OF CALCITE WITH PRESSURE.
Chicago Univ Ill Dept of the Geophysical Sciences
For primary bibliographic entry see Field 8G.
AD-659 036 HC$3.00 MF$0.65

STANDARD X-RAY DIFFRACTION POWDER PATTERNS,
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 7D.
NBS-Mono-25-Section-5 HC$0.55 MF$0.65

STUDY OF GROWTH PARAMETERS FOR REFRACTORY CARBIDE SINGLE CRYSTALS FINAL REPORT, 1 MAR. 1964 - 30 JUN. 1967.
Stanford Research Inst., Menlo Park, Calif.
R. W. Bartlett, and F. A. Halden. 30 Jun 67, 109p
NASA-CR-88354
Contract NASR-49/19/

Descriptors: *Crystal growth, *Liquid metal, *Refractory metal, *Single crystal, *Tantalum carbide, Boules, Carbide, Crystal, Growth, Hafnium, Hafnium carbide, Liquid, Metal, Nucleation, Refractory, Single, Solution, Tantalum, Vaporization.

For abstract, see STAR 05 21.
N67-36081 HC$3.00 MF$0.65

THE EFFECT OF REPEATED STRESSING ON THE BEHAVIOR OF LITHIUM FLUORIDE CRYSTALS.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 20K.
PB-175 898 HC$3.00 MF$0.65

20C. Electricity and Magnetism

EXPLORATORY RESEARCH OF MAGNETIC MATERIALS BY ULTRASONIC TECHNIQUES.
Final progress rept.,
Colorado Univ Boulder
A. W. Bevan, Jr., A. C. Daniel, and R. J. Mahler.
Jul 67, 23p
AROD-6996:2-RT
Grant DA-ARO (D)-31-124-G860
Prepared in cooperation with National Bureau of Standards, Boulder, Colo.

Descriptors: (*Magnetic materials, *Ultrasonic properties), Ultrasonic radiation, Attenuation, Single crystals, Manganese compounds, Fluorides, Sodium compounds, Bromine compounds, Oxides, Cobalt compounds, Iron compounds, Chlorides, Antiferromagnetism, Nuclear magnetic resonance, Nuclear spins, Relaxation time.
Identifiers: Cobaltous chloride, Cobaltous fluoride, Ferrous chloride, Manganous fluoride, Sodium bromate.

The ultrasonic attenuation in a single crystal of MnF2 was investigated; and the temperature dependence of nuclear spin-lattice relaxation times in NaBrO3 and in the antiferromagnetic crystals CoF2, CoCl2.2H2O, and FeCl2.2H2O were determined. (Author)
AD-658 467 HC$3.00 MF$0.65

STUDY OF MAGNETORESISTANCE AND MAGNETIC SWITCHING IN FERROMAGNETIC THIN FILMS.
Final rept. 1 Feb-30 Jun 67,
Naval Air Engineering Center Philadelphia Pa Aeronautical Materials Lab
L. J. Brooks. 30 Jun 67, 42p Rept no. NAEC-AML-FR50

Descriptors: (*Ferromagnetic materials, Films), (*Magnetostriction, *Films), Magnetic fields, Circuits, Resistance (Electrical), Electrical conductance, Measurement, Accuracy.

The study describes the fundamental behavior of a single magnetic domain under the influence of magnetic fields at small angles to the film normal. The longitudinal and transverse data are compared, and it is found, for the cases considered, that the single domain theory is valid, with the reservation that at low fields, domain formation produces an apparent attenuation of the transverse data. The apparent success of this study is compared to those by Jurretschke, and Ke and Juritsyna, is possibly due to the investigation of the governing equilibrium conditions. For each distinct field position, the solutions obtaining from these conditions are not necessarily continuous or minimum energy solutions, and care must be taken to assure that the minimum energy condition is satisfied. (Author)
AD-658 497 HC$3.00 MF$0.65

MAGNETODIELECTRICS,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 11G.
AD-658 511 HC$3.00 MF$0.65

RESEARCH ON ELECTROMAGNETICS FOR PROJECT DEFENDER.
Professional Design Co Agawam Mass
For primary bibliographic entry see Field 20I.
AD-658 518 HC$3.00 MF$0.65

FIELD EMISSION FROM A MULTIPLICITY OF EMITTERS ON A BROAD-AREA CATHODE,
Illinois Univ Urbana Coordinated Science Lab
H. Tomaschke, and D. Alpert. 10 Aug 66, 2p
Contract DA-28-043-AMC-00073 (E), Grant NGR-14-005-038
Availability: Published in Journal of Applied Physics v38 n2 p881-3 Feb 1967.

Descriptors: (*Field emission, Cathodes), Electric currents, Electric fields, Surface properties, Voltage.

The report examines the nature of the curve to be expected from the summation of the field emission currents from a distribution of separate emission sites on a cathode surface.
AD-658 647 Not available from CFSTI.

HIGH-TEMPERATURE EXPANSIONS FOR THE CLASSICAL HEISENBERG MODEL. I. SPIN CORRELATION FUNCTION.
Doctoral thesis,
Massachusetts Inst of Tech Lexington Lincoln Lab
H. Eugene Stanley. 31 Jan 67, 10p Rept no. JA-2850
ESD-TR-67-499
Contract AF 19 (628)-5167
Prepared in cooperation with Harvard Univ., Cambridge, Mass. Lyman Lab. of Physics.
Availability: Published in The Physical Review v158 n2 p537-45 Jun 10 1967.

Descriptors: (*Nuclear spins, Magnetism), (*Crystal lattices, Magnetism), (*Spinels, Magnetic properties), Theses, Thermodynamics, Quantum mechanics, Ferromagnetism, Operators (Mathematics), Hamiltonian, Theorems, Interactions, Neutron scattering.
Identifiers: Heisenberg ferromagnet, Manganese chromite, Cubic crystals.

The diagrammatic representation of the first nine coefficients for loose-packed lattices and the first eight coefficients for close-packed lattices in a high-temperature series expansion of the zero-field spin correlation function (Sf.Sg)beta is presented. This calculation exploits the order-of-magnitude simplifications which occur in treating the quantum-mechanical spin operators in the Heisenberg model as isotropically interacting classical vectors of length (S (S + 1))to the 1/2 power. An example of the applicability of the series expansion of (Sf.Sg)beta to obtain information concerning the short-range magnetic order to be expected for T>Tc, a calculation of the elastic paramagnetic neutron-scattering cross section for normal cubic spinels with nearest-neighbor A-B and B-B exchange interactions is given, and contact is made with experiments on MnCr2O4.
AD-658 762 Not available from CFSTI.

HIGH-TEMPERATURE EXPANSIONS FOR THE CLASSICAL HEISENBERG MODEL. II. ZERO-FIELD SUSCEPTIBILITY.
Doctoral thesis,
Massachusetts Inst of Tech Lexington Lincoln Lab
H. Eugene Stanley. 31 Jan 67, 7p Rept no. JA-2907
ESD-TR-67-487
Contract AF 19 (628)-5167
Prepared in cooperation with Harvard Univ., Cambridge, Mass. Lyman Lab. of Physics.
Availability: Published in The Physical Review v158 n2 p546-51 Jun 10 1967.

Descriptors: (*Nuclear spins, Magnetism), (*Crystal lattices, Magnetism), (*Magnetic properties, Quantum mechanics), Phase studies, Hamiltonian, Interactions.
Identifiers: Heisenberg ferromagnet, Cubic crystals.

The report contains expressions--in terms of Domb's lattice constants for the first nine terms al for loose-packed lattices and the first seven terms for close-packed lattices in the high-temperature series (1) for the zero-field magnetic susceptibility. These 'general lattice expressions' were used to compute numerical values of the coefficients al for the fcc, bcc, and sc (three-dimensional) lattices, and for the plane square, triangular, and honeycomb (two-dimensional) lattices. Two questions of current interest were then discussed with the aid of the coefficients.
AD-658 766 Not available from CFSTI.

EXPERIMENTAL TECHNIQUES WITH GENERAL APPLICABILITY FOR THE STUDY OF MAGNETIC PHENOMENA,
Massachusetts Inst of Tech Lexington Lincoln Lab
Kirby Dwight. 1967, 6p Rept no. MS-1815
ESD-TR-67-334
Contract AF 19 (628)-5167
Report on proj Magnetic Measurements.
Availability: Published in Journal of Applied Physics v38 n3 p1505-9 Mar 1 1967.

Descriptors: (*Magnetic properties, Measurement), (*Magnetometers, Magnetic properties), (*Neutron diffraction analysis, Magnetic materials), (*Differential thermal analysis, Magnetic materials), Magnetic fields, Anisotropy, Torque, Phase studies.

A review of the well-known magnetometer techniques for measuring magnetic properties is presented. Special attention is given to the peculiarities of each method which render it particularly attractive, or otherwise, for particular measurements. In addition, an attempt is made to estimate the investment in time and money required to implement the various techniques. Neutron diffraction methods and differential thermal analysis can also be used in the investigation of any magnetic material. Hence, they are included in this survey. (Author)
AD-658 768 Not available from CFSTI.

EXPERIMENT IN CRYOGENICS FOR THE UNDERGRADUATE.
Revised ed.,
Clemson Univ S C
E. P. Stillwell, Jr., R. L. Gardner, and H. T. Littlejohn. 20 Jan 67, 4p
AFOSR-67-2189
Grant AF-AFOSR-180-65
Revision of manuscript submitted 13 Jun 66.
Availability: Published in American Journal of Physics v35 n6 p502-4 Jun 1967.

Descriptors: (*Cryogenics, Experimental design), (*Teaching methods, Cryogenics), (*Superconductivity, Tin), Resistance (Electrical), Phase studies, Temperature, Helium, Students.

A simple piece of inexpensive apparatus is described with which experiments may be done be-

tween 2 degrees and 300 degrees K directly in a liquid-helium storage Dewar. The apparatus is suitable for use by undergraduates, and an experiment to determine the temperature dependence of resistance and the superconducting transition temperature of tin is described. (Author)
AD-658 805 Not available from CFSTI.

ELECTRODE PHENOMENA IN A HIGH CURRENT 20 NANOSECOND SPARK.
Physical sciences research papers no. 335,
Air Force Cambridge Research Labs L G Hanscom Field Mass
H. Fischer, and C. C. Gallagher. Jul 67, 15p Rept no. AFCRL-67-0446

Descriptors: (*Optical phenomena, Electrodes), Kerr cells, Electric currents, Sparks, Cathodes, Sensitivity, Optical properties, Spectrometers.

Reported here are some direct observations of the development of optical phenomena related to initial electrode processes in a 4000 A spark discharge of approximately 10 to 20 nsec duration in 1 atmosphere air, gap 0.85mm. The development of directed flares originating from the anode spot is photographed by means of a 8 nsec Kerr cell shutter and is tentatively identified as a directed explosive type of erosion, which was predicted. (Author)
AD-658 825 HC$3.00 MF$0.65

THEORETICAL ANALYSIS OF A SECONDARY EMISSION EXPERIMENT ON INSULATORS,
Parke Mathematical Labs Inc Carlisle Mass
Charles H. Sherman, and Nan E. Gordon. Jul 67, 53p Rept no. Scientific-7
AFCRL-67-0459
Contract AF 19 (628)-2419

Descriptors: (*Secondary emission, Mathematical models), (*Photoconductivity, Mathematical models), Dielectrics, Radiation damage, Numerical analysis, Computer programs, Photoelectric effect.

A mathematical model is developed of a simple experimental situation involving secondary electron emission and radiation induced conductivity in insulating materials. The observable current is related to other variables and to various material properties, and a practical numerical method of computation is given. Typical numerical results obtained with the help of a Fortran program for the IBM 1130 computer are presented and discussed. The model is expected to be useful in planning experiments and in interpreting experimental data.
AD-658 831 HC$3.00 MF$0.65

ELECTROREFLECTANCE STUDY OF INTERBAND MAGNETO-OPTICAL TRANSITIONS IN InAs AND InSb AT 1.5K.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20L.
AD-658 835 HC$3.00 MF$0.65

ELECTRICAL RESISTIVITY OF BORON FIBERS,
Boeing Scientific Research Labs Seattle Wash Solid State Physics Lab
For primary bibliographic entry see Field 11D.
AD-658 896 HC$3.00 MF$0.65

SPONTANEOUS BAND MAGNETISM,
Massachusetts Inst of Tech Lexington Lincoln Lab
John B. Goodenough. 1967, 4p Rept no. MS-1791
ESD-TR-67-333
Contract AF 19 (628)-5167
Availability: Published in Journal of Applied Physics v38 n3 p1054-6 Mar 1 1967.

Descriptors: (*Magnetism, Band theory of solids), Ferromagnetism, Iron, Magnetic properties, Transition elements, Spin.

With sharply defined, critical overlap integrals delta sub c and delta sub c (f) for a localized-electron reversibly yields collective-electron transition and for spontaneous band ferromagnetism, the conditions for band ferromagnetism to occur are: delta sub c < delta sub b < delta sub c (f), and delta sub c < delta sub ab < delta sub c (f) < delta sub b, where the overlap integrals delta sub ab < delta sub b are each proportional to the bandwidths of antibonding and bonding bands, respectively. Spontaneous magnetism also depends upon the electron/atom ratio: Half-filled bands may exhibit antiferromagnetism, but not ferromagnetism. If delta sub c < delta sub b < delta sub c (f), bands less than one-quarter filled may exhibit ferromagnetism with magnetization < or = n sub d mu B per atom and a distributed spin density as in ZrZn2, where n sub d, n sub h, and n sub ab are numbers of electrons, holes, and antibonding electrons per atom. Bands more than three-quarters filled may be ferromagnetic with a localized atomic moment of n sub h mu B. Bands more than half-filled and less than three-quarters filled give a localized atomic moment of n sub h mu sub B, if delta sub c < delta sub b < delta sub c (f), and are either ferromagnetic or exhibit a spiral-spin configuration. However, if delta sub c < delta sub ab < delta sub c (f) < delta sub b, ferromagnetism with a reduced atomic moment of n sub ab mu B per atom is predicted. The spin density is localized, but a small negative-spin density may occur at large distances from the atom. (Author)
AD-658 905 Not available from CFSTI.

QUANTUM KINETIC EQUATIONS FOR ELECTRONS IN RANDOM IMPURITIES,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20L.
AD-658 909 Not available from CFSTI.

PRESSURE EFFECTS ON THE ELECTRICAL PROPERTIES OF POLYCRYSTALLINE BORON.
Denver General Hospital Colo
For primary bibliographic entry see Field 7D.
AD-658 929 Not available from CFSTI.

DESCRIPTION OF AXISYMMETRIC WAVE PROPAGATION IN A UNIFORM, FINITE, SOLID ELECTRON BEAM.
Research and development technical rept.,
Army Electronics Command Fort Monmouth N J
Bruno Zotter. Jul 67, 40p Rept no. ECOM-2868

Descriptors: (*Cyclotron waves, Propagation), Electron beams, Space charges, Plasma physics, Magnetic fields, Boundary value problems, Scattering, Electron tubes, Microwave equipment.

The slow-wave approximation is used to derive the dispersion relation for a uniform, finite, solid electron beam in a concentric tunnel. A finite, longitudinal magnetic field is used to focus the beam. Radial and longitudinal propagation constants are computed for modes with axial symmetry. The propagation constants and the plasma frequency reduction factor are presented in a novel, graphical form which allows construction of the Brillouin diagram in a simple straightforward way. A number of representative Brillouin diagrams are shown, and the modes are classified in accordance with their characteristics. (Author)
AD-658 987 HC$3.00 MF$0.65

SCATTERING FROM LOW-DENSITY DIELECTRIC BODIES.
Revised ed.,
Northwestern Univ Evanston Ill Information-Processing and Control Systems Lab
M. A. Plonus. 6 Jan 67, 7p Rept no. TR-67-114
Contract N00014-67-A-0356-0003, Grant NSF-GK-1350
Revision of manuscript submitted 1 Jul 66. Research supported in part by AFOSR, Contract AF-49 (638)-1377.
Availability: Published in IEEE Transactions on Antennas and Propagation vAP-15 n3 p437-41 May 1967.

Descriptors: (*Dielectric properties, Coherent scattering), Backscattering, Cylindrical bodies, Spheres, Lenses, Density, Optics, Physical properties, Mathematical analysis.

It is shown that the coherent scattering integral provides a convenient and mathematically tractable method of solving scattering problems of large, low-density, dielectric bodies. In this method the solid dielectric body is replaced by an assembly of particles whose boundary coincides with the outside surface of the dielectric body. Considering the coherent scattering integral, and realizing that coherent scattering comes primarily from sudden particle density changes such as the boundaries of a particle system, it is shown that for low-density dielectric bodies of arbitrary shape the coherent scattering integral yields the physical optics cross section of the dielectric body. Backscattering echo areas for a cylinder, sphere, lens, and various truncated cones are derived and discussed. (Author)
AD-659 019 Not available from CFSTI.

TECHNIQUE FOR MEASURING THE HALL EFFECT IN HIGH RESISTIVITY THIN FILMS.
Summary rept.,
Naval Avionics Facility Indianapolis Ind
Kashinath M. Ghanekar. 21 Aug 67, 19p Rept no. NAFI-TR-1086

Descriptors: (*Hall effect, Films), (*Films, *Cadmium selenides), Cadmium selenides, Resistance (Electrical), Measurement, Voltmeters, Electrical impedance, Thickness, Electric fields, Mobility.

The Hall effect theory, its application and method of measurement are discussed. Techniques of measurement and attendant problems are given for the determination of resistivity, Hall coefficient and mobility in high resistivity thin films of cadmium selenide. The equipment requirements for making such measurements are listed. (Author)
AD-659 024 HC$3.00 MF$0.65

JOSEPHSON TUNNELING IN SUPERCONDUCTORS,
Los Alamos Scientific Lab., N. Mex.
Leonard W. Gruenberg. Jun 65, 20p
Contract W-7405-eng-36

Descriptors: (*Superconductors, *Tunneling (Electronics)), Superconductivity, Electrical properties.

For abstract, see NSA 21 19.
LA-3414 HC$3.00 MF$0.65

EXACT SEMICLASSICAL THEORY FOR GALVANOMAGNETIC EFFECTS IN METALS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 20L.
For abstract, see STAR 05 21.
N67-35591 HC$3.00 MF$0.65

20D. Fluid Mechanics

A REVIEW OF JET EFFLUX STUDIES APPLICABLE TO V/STOL AIRCRAFT,

Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 1C.
AD-658 432 HC$3.00 MF$0.65

EFFECTS OF ROLL ON THE FREE-FLIGHT MOTION OF STATICALLY STABLE BODIES,
Arnold Engineering Development Center Arnold Air Force Station Tenn
C. J. Welsh, and R. M. Watt. Sep 67, 31p Rept no. AEDC-TR-67-156
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Roll, Aerodynamic configurations), (*Yaw, Aerodynamic configurations), (*Model tests, Motion), Statics, Stability, Tests, Damping, Wind tunnels.

The effects of roll on the free-flight yawing motion of statically stable test models, having linear force and moment characteristics, are discussed in more detail than in previous publications. The correspondence between the damping, frequency, and amplitude of the nutational and precessional vectors which define the motion is listed. Limitations in the use of simplified data reduction procedures when the model motion is monitored in only one plane are pointed out, and cases of pseudo-nonlinear characteristics being exhibited by the orthogonal components of the yawing motion of a rolling motion are demonstrated. (Author)
AD-658 433 HC$3.00 MF$0.65

ON AN ALTERNATIVE METHOD OF NUMERICALLY EVALUATING THE LINEARIZED PROBLEM OF AN IMPULSIVELY MOVING FLAT PLATE IN A RAREFIED GAS FLOW,
Aerospace Research Labs Wright-Patterson AFB Ohio
Kanakanahalli S. Nagaraja, and James P. Hudson. Jun 67, 25p Rept no. ARL-67-0124

Descriptors: (*Superaerodynamics, *Numerical analysis), Integral equations, Groups (Mathematics), Integration, Flow fields, Integral transforms.

In the Rayleigh problem formulated according to the BGK kinetic model, the flow field is described by a singular integral equation of the Fredholm type. The singularity appears not only as a limit of integration, but also in the kernel. Since the singularity in the kernel is of the logarithmic type, Luke's weight coefficients for evaluating an integral near a logarithmic singularity are applied to solve the integral equation numerically. The successful evaluation of the integral equation on an IBM 7094 demonstrates the generality of the method. (Author)
AD-658 458 HC$3.00 MF$0.65

LECTURES ON TURBULENT FLOW,
New York Univ N Y Dept of Aeronautics and Astronautics
Carlo Ferrari, and Gdalia Kleinstein. Dec 66, 219p Rept no. NYU-AA-66-69
AFOSR-67-2168
Contract Nonr-285 (63), Grant AF-AFOSR-1062-66

Descriptors: (*Turbulence, *Fluid flow), (*Turbulent boundary layer, Mathematical analysis), Incompressible flow, Compressible flow, Equations of motion, Stresses, Statistical functions, Boundary layer.

The work deals with the nature of turbulent motion. The general equations of turbulent flow are described and the fundamental difficulty inherent in the formulation of the problem is demonstrated. From these equations, some important consequences and information of a general nature are derived and applied to a simple wall turbulence problem. A solution is obtained with the aid of a minimum number of auxiliary hypotheses. The problem is first solved assuming an incompressible fluid and then methods are used to permit the utilization of the incompressible results on compressible flow problems. Some attempts to put turbulence theory on a completely rational basis are explored. (Author)
AD-658 483 HC$3.00 MF$0.65

THE STATIC AERODYNAMIC CHARACTERISTICS OF A VARIABLE SWEEP WING RESEARCH MODEL.
Test rept.,
David Taylor Model Basin Washington D C Aerodynamics Lab
John M. Durkin, and David G. Lee. Mar 67, 64p Rept no. Test AL-38

Descriptors: (*Variable-sweep wings, Aerodynamic characteristics), Statics, Models (Simulations), Mach number, Angle of attack, Lift, Drag, Pitch (Motion).

A wind tunnel study was conducted to determine the effect of Mach number, angle of attack, and wing sweep angle on the longitudinal aerodynamic characteristics of a variable sweep wing research model. The study was conducted at Mach numbers between 0.60 and 1.15 and at angles of attack from -2 to 16 degrees. The report presents the data for the static phase of the investigation. (Author)
AD-658 498 HC$3.00 MF$0.65

FLOW OF LIQUID THROUGH MULTIPLE ORIFICES.
Technical memo.,
Naval Weapons Lab Dahlgren Va
W. G. Soper. Sep 67, 49p Rept no. NWL-TM-11/67

Descriptors: (*Orifices, Fluid flow), (*Tanks (Containers), Fluid flow), (*Liquids, Fluid flow), Fuel tanks, Water tanks, Leakage (Fluid), Gasoline, Fuel oil, Damage assessment, Vulnerability, Configuration.

A model is developed for predicting the rate of fluid loss from a closed tank containing an arbitrary number of perforations (orifices). Good agreement with experiment is obtained for the two orifice shapes (circular and rectangular) and the three liquids (water, gasoline, and diesel fuel) which were studied. Results indicate that the graphs and formulas developed will apply to many other orifice shapes and liquids. (Author)
AD-658 501 HC$3.00 MF$0.65

STUDY OF THE SURFACE FILMS OF GAS NUCLEI (AS RELATED TO CAVITATION AND TENSILE STRENGTH IN WATER). PART III. DISSOLVING OF GAS NUCLEI IN TURBULENT FLOW.
Final rept. Jan-Dec 66,
General Electric Co Schenectady N Y Research and Development Center
L. H. Bernd. May 67, 89p Rept no. S-67-1138
Contract Nonr-4296 (00)

Descriptors: (*Cavitation, Bubbles), (*Bubbles, Surface properties), (*Films, Bubbles), Surface tension, Solubility, Water tunnels, Gases, Tensile properties, Turbulence, Fluid flow, Mass transfer, Water.

The paper is a report of an experimental investigation of the dissolving of gas nuclei (small gas bubbles) in turbulently flowing water in a pipe. The rate of dissolving is important in a circulating water tunnel because it determines whether or not cavitation produced nuclei reach a small size to produce tensile strength in the water, increase the cavitation inception level, and affect the results of a cavitation test. The rate of dissolving is greatly affected by the presence of surface films that form about gas nuclei from trace organic materials dissolved in the water. (Author)
AD-658 517 HC$3.00 MF$0.65

RESEARCH ON ELECTROMAGNETICS FOR PROJECT DEFENDER.
Professional Design Co Agawam Mass
For primary bibliographic entry see Field 20I.
AD-658 518 HC$3.00 MF$0.65

EXTERNAL FLOWS OF VISCOELASTIC MATERIALS: FLUID PROPERTY RESTRICTIONS ON THE USE OF VELOCITY-SENSITIVE PROBES.
Delaware Univ Newark Dept of Chemical Engineering
For primary bibliographic entry see Field 7A.
AD-658 523 Not available from CFSTI.

A BOUNDARY-LAYER THEORY FOR CELLULAR CONVECTION.
Cornell Univ Ithaca N Y Graduate School of Aerospace Engineering
For primary bibliographic entry see Field 20M.
AD-658 525 Not available from CFSTI.

THE RAYLEIGH-TAYLOR STABILITY OF CONFINED VISCOUS FLUIDS WITH AN INTERFACE,
Fluid Thermal and Aerospace Sciences Case Inst of Tech Cleveland Ohio
Richard J. Prutow, and Simon Ostrach. Jun 67, 111p Rept no. FTAS/TR-67-23
AFOSR-67-1509
Grant AF-AFOSR-194-67

Descriptors: (*Fluids, Boundary value problems), Interfaces, Gravity, Cylindrical bodies, Viscosity, Surface tension, Vortices, Stability.

The paper is concerned with the interfacial stability of two stationary superposed viscous fluids confined within a rigid container and subject to both capillary and gravity forces, the gravitational force being directed from the heavier toward the lighter fluid. The stability of a static 'equilibrium' interface when subject to a small disturbance is first posed as a linear initial boundary value problem and the solution obtained in terms of the normal modes associated with a normal mode analysis. The normal modes problem is then recast as a variational problem for the disturbance growth rates. Two parameters appear, the Bond number, and a viscous parameter. The linearization requires the viscous parameter to be of unit order. Using the method of undetermined functions, an approximate solution of the variational problem is obtained for the particular case of a right circular cylindrical container and a flat interface. The unstable growth rates are calculated and the critical Bond number determined to be 14.67. It is found that the viscous forces stabilize the interface. (Author)
AD-658 548 HC$3.00 MF$0.65

TRANSIENT NATURAL CONVECTION IN A VERTICAL TUBE WITH NON-AXISYMMETRIC WALL TEMPERATURE,
Fluid Thermal and Aerospace Sciences Case Inst of Tech Cleveland Ohio
Pau-Chang Lu, and G. S. R. Sarma. Jun 67, 20p Rept no. FTAS/TR-67-18
AFOSR-67-1508
Grant AF-AFOSR-194-67

Descriptors: (*Fluid flow, *Convection (Heat transfer)), Pipes, Temperature, Integral transforms, Velocity, Bessel functions.

Izumi has investigated the commencement of the natural convection flow inside of a vertical circular tube. The quasi-incompressible fluid is initially at rest with a uniform temperature the same as the wall temperature. At time $t = 0$, the wall temperature is suddenly changed. With a body force acting

in the axial direction, a natural convection flow starts owing to the transient non-uniform temperature field established in the fluid. Izumi only investigated the case where the wall temperature is uniform at all times. In practice, it is more likely to find a change of the wall temperature from the initial uniform value to a new non-uniform distribution. The ensuing flow will no longer be axisymmetric as in Izumi's work. It is our object here to examine such transient non-axisymmetric flows. (Author)
AD-658 549 HC$3.00 MF$0.65

APPLICATION OF THE HYDRAULIC ANALOGY TO INTERNAL SUBSONIC FLOW,
Army Missile Command Redstone Arsenal Ala Army Inertial Guidance and Control Lab and Center
Carl Hugh Warren. Jul 67, 94p Rept no. RG-TR-67-19

Descriptors: (*Subsonic flow, Two-dimensional flow), (*Fluid amplifiers, Subsonic flow), Analog systems, Hydraulic systems, Water, Air, Fluidics.

An experimental study was made to determine the quantitative accuracy of the hydraulic analogy when applied to subsonic internal flows such as exist in pure fluid elements. The analogy is based upon the correspondence between density and depth (or pressure and depth squared) when the Mach number and Froude number are equal. Experiments were run in air and in water on geometrically similar nonsymmetrical flow dividers. A factor was used to correct for the difference in apparent specific heat ratios k. (Apparent k = 2 for hydraulic flow, k = 1.4 for air flow.) After this correction was made, the data correlated to within three percent. The Reynolds number for the water flow varied from about 1,500 to 4,000 and, for the air flow, from 17,000 to 100,000. The good correlation, even though some of the water data was taken in apparently laminar flow, indicated that inertial effects predominated over viscous effects. This was because the fluid was essentially at rest before it entered the flow divider. The geometry was characterized by sharp angles and relatively short flow lengths so that convective acceleration and separation zones dominated the flow and established patterns of velocity distribution did not have a chance to completely develop. (Author)
AD-658 669 HC$3.00 MF$0.65

FLUID PHYSICS OF HYPERSONIC WAKES, VOLUME I.
Conference proceedings.
Advisory Group for Aerospace Research and Development Paris (France)
May 67, 540p Rept no. AGARD-CP-19-Vol-I
NATO Furnished, Presented at a Specialists' Meeting of the Fluid Dynamics Panel of AGARD, Colorado State Univ., Fort Collins, 10-12 May 67. See also Volume 2, AD-658 706.

Descriptors: (*Hypersonic flow, *Wake), Hypersonic characteristics, Stability, Ablation, Nonequilibrium flow, Conical bodies, Electron density.

The collection of papers emphasizes the areas: flow over bodies, inviscid and viscous wakes, near and far wakes characteristics, stability and transition, equilibrium and non-equilibrium wake profiles, ablating and non-ablating bodies.
AD-658 705 HC$3.00 MF$0.65

FLUID PHYSICS OF HYPERSONIC WAKES, VOLUME II.
Conference proceedings.
Advisory Group for Aerospace Research and Development Paris (France)
May 67, 506p Rept no. AGARD-CP-19-Vol-2
NATO Furnished. Presented at a Specialists' Meeting of the Fluid Dynamics Panel of AGARD, Colorado State Univ., Fort Collins, 10-12 May 67. See also Volume 1, AD-658 705.

Descriptors: (*Hypersonic flow, *Wake), Hypersonic characteristics, Slender bodies, Conical bodies, Turbulence, Atmosphere entry, Ballistics, Electron density, Ablation.

Contents: Turbulence characteristics in the hypersonic wake of a sharp slender cone; Studies of the turbulence in the wake of hypersonic spheres under simulated re-entry conditions; Some statistical properties of turbulent wakes; Pulsations in the wakes of hyperballistic spheres during atmospheric re-entry; Radar investigation of the wakes of blunt and slender hypersonic velocity projectiles in the ballistic range; Electrostatic probe measurements in the turbulent wake of hypersonic spheres fired in a ballistic range; Etudes de sillages electroniques au tunnel de tir hyperbalistique; Wake electron density measurements behind hypersonic spheres and cones; Utilisation des soufleries a arc bref pour l'etude des sillages ionises; Material effects of low temperature ablators on hypersonic wake properties of slender bodies; Measured and predicted ablation-product radiation in the near wake; Ballistics range measurements of wake electron density and spectral emission; Boundary-layer phenomena observed on the ablated surfaces of cones recovered after flights at speeds up to 7 km/sec.
AD-658 706 HC$3.00 MF$0.65

THE EFFECTS OF WATER VAPOR ON THE ELECTRON DENSITY OF SHOCK HEATED AIR,
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 20I.
AD-658 719 HC$3.00 MF$0.65

RECENT ADVANCES IN AEROTHERMOCHEMISTRY, VOLUME I.
Advisory Group for Aerospace Research and Development Paris (France)
For primary bibliographic entry see Field 7D.
AD-658 781 HC$3.00 MF$0.65

RECENT ADVANCES IN AEROTHERMOCHEMISTRY, VOLUME II.
Advisory Group for Aerospace Research and Development Paris (France)
For primary bibliographic entry see Field 7D.
AD-658 782 HC$3.00 MF$0.65

MERGED LAYER IONIZATION IN THE STAGNATION REGION OF A BLUNT BODY.
Technical rept. Aug 65-Apr 67,
Aerospace Corp San Bernardino Calif San Bernardino Operations
Richard H. C. Lee, and Thomas A. Zierten. Jun 67, 35p Rept no. TR-1001 (S2240-10)-1
SSD-TR-67-149
Contract AF 04 (695)-1001

Descriptors: (*Blunt bodies, Stagnation point), (*Gas ionization, *Stagnation point), Boundary layer, Nonequilibrium flow, Dissociation, Chemical reactions, Shock waves, Electron density, Atmosphere entry, Aerodynamic heating, Plasma sheath.

Nonequilibrium air dissociation and ionization in the stagnation region of a blunt body are investigated in the merged layer regime. A chemical system of seven species undergoing six simultaneous reactions is considered. The species conservation equations are decoupled from the simplified Navier-Stokes equations for a thin layer model. However, the complex chemical system is allowed to experience the entire merged layer flow environment in a continuous manner from the shock transition region to the viscous shock layer. Solutions are presented for a catalytic blunt body flying at 23,000 fps and at Re = 814 and 1230. The results show that viscous effects dominate the entire merged layer and that the air dissociation and ionization are mainly confined to the viscous shock layer with negligible reaction rates in the shock transition region. Comparisons with nonequilibrium inviscid solutions indicate that the inviscid theory overestimates the peak electron density by as much as two orders of magnitude at the lowest Reynolds number considered. This difference between the merged layer solution and the inviscid solution is attributed to a combination of wall cooling and diffusion of atoms and electrons away from the shock layer. (Author)
AD-658 859 HC$3.00 MF$0.65

FORMATION OF CAVITIES AND MICROJETS IN LIQUIDS AND THEIR ROLE IN INITIATION AND GROWTH OF EXPLOSION.
Cambridge Univ (England) Cavendish Lab
For primary bibliographic entry see Field 19D.
AD-658 958 Not available from CFSTI.

WIND TUNNEL TEST STUDY.
Collins Radio Co Cedar Rapids Iowa Aeronautical Research Lab
For primary bibliographic entry see Field 14B.
AD-658 995 HC$3.00 MF$0.65

WIND TUNNEL TEST STUDY.
Collins Radio Co Cedar Rapids Iowa Aeronautical Research Lab
For primary bibliographic entry see Field 14B.
AD-658 996 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF HEAT EXCHANGE OF FLAT PLATE IN SUPERSONIC RAREFIED GAS FLOW,
Foreign Technology Div Wright-Patterson AFB Ohio
S. I. Kosterin, Yu. A. Koshmarov, and N. M. Gorskaya. 18 Aug 67, 18p Rept no. FTD-MT-67-43 TT-67-62974
Eksperimentalnoe Issledovanie Teploobmena Ploskoi Plastiny v Sverkhzvukovom Potoke Razrezhennogo Gaza, edited machine trans. of Inzhenernyi Zhurnal (USSR), v2 n2 p263-9 1962.

Descriptors: (*Supersonic flow, *Heat transfer), (*Superaerodynamics, Flat plate models), Nozzle gas flow, Heat transfer coefficients, Two-dimensional flow, Temperature, USSR.

The work is dedicated to experimental investigation of recovery temperature and average coefficients of heat transfer on a flat plate in a supersonic rarefied gas flow at zero angle of attack. (Author)
AD-659 023 HC$3.00 MF$0.65

AN ELECTRONIC WAVE-HEIGHT MEASURING APPARATUS.
Research and development rept.,
David Taylor Model Basin Washington D C
W. S. Campbell. Sep 63, 18p Rept no. DTMB-859
Revised ed.

Descriptors: (*Water waves, *Electronic recording systems), Meters, Measurement, Height finding, Instrumentation.

This report describes briefly the salient features of new instrumentation for measuring and recording the wave amplitudes and wave forms of water waves. Because of the increased accuracy and flexibility afforded by the instrumentation described, it has replaced other techniques which were formerly used. The gaging element of this system consists of extremely small insulated wire, suspended rigidly upright in the water. The conductor acts as one plate of a capacitor and the water in which the gaging element is partially submerged acts as the other; the insulation material on the wire forms the dielectric of the capacitor. The capacity of this 'condenser' (measured between the conductor and water) is directly propor-

tional to the linear length of the submerged portion of the wire. This capacitor is connected in one arm of a resonant-bridge circuit, which may be balanced for the quiescent level of the water. Variations in water height which occur as waves pass the gaging element produce capacitive unbalance of the a-c bridge in each sense, and the direction of unbalance is recovered by a more or less conventional phase sensitive demodulator circuit incorporated in the circuit of the wave-height recorder. This report includes schematic wiring diagrams of the instrument, its power supply, and a direct-coupled amplifier suitable for driving the recording galvanometer in a Sanborn direct-wiring recorder. (Author)
AD-659 031 HC$3.00 MF$0.65

CHOKING OF STRUT-VENTILATED FOIL CAVITIES.
Technical rept.,
Hydronautics Inc Laurel Md
C. Elata. May 67, 55p Rept no. TR-605-2
Contract N00014-66-C-0003

Descriptors: (*Cavitation, Fluid dynamic properties), Mass transfer, Drag, Air, Hydrofoils, Pressure, Supports, Hydrodynamic configurations.
Identifiers: Base-vented struts, Entrainment.

Presented are the results of an investigation of the 'choking' phenomenon in base vented strut cavities. In practice such base vented struts support a ventilated foil and provide the ventilation air for the foil through the strut cavity. An expression for the rate of air entrainment in ventilated cavities is derived. This expression fits previously reported experimental data except at low cavitation numbers, when free surface- solid boundary- and gravitational effects may become important. The shape of the cavity behind a strut, supporting a strut-ventilated foil, is analyzed. It is shown that the shortest section of the strut cavity is at the free surface, and that its length is controlled by the air flow through it. The choking phenomenon is analyzed by relating the air flow through the strut cavity to the air demand of the foil cavity. From this analysis a choking coefficient is defined. A series of experiments is described in which, for three strut-supported foils, the depth at choking was determined as a function of free stream velocity, angle of attack, and air pressure. (Author)
AD-659 046 HC$3.00 MF$0.65

THE DTMB PLANAR-MOTION-MECHANISM SYSTEM.
Test and evaluation rept.,
Naval Ship Research and Development Center Washington D C Hydromechanics Lab
Morton Gertler. Jul 67, 51p
NSRDC-2523

Descriptors: (*Underwater objects, Motion), (*Fluid dynamic properties, *Test facilities), Pitch (Motion), Equations of motion, Hydrodynamics, Oscillation, Model tests, Test equipment, Stability.

The paper describes and discusses the underlying principles of a planar-motion-mechanism system which incorporates in one device a means for experimentally determining all of the hydrodynamic-stability coefficients required in the equations of motion for a submerged body in six degrees of freedom. These include coefficients usually classified into the three categories of static-stability, rotary-stability, and acceleration derivatives. The most unique feature of the system is the method used to impart hydrodynamically pure pitching and heaving motions to a given submerged body. This enables the explicit and accurate determination of individual derivatives without resort to the solution of simultaneous equations as is necessary when other types of oscillation devices are used. Other combinations of pitching and heaving motions can also be produced by the mechanism, if so desired. The balance system used to measure the forces and moments also differs distinctly from the multi-component dynamometers used by most other model-basin or wind-tunnel facilities. It is composed of modular flexural gages employing a variable-reluctance transducer which individually measure a single force in either the X-, Y-, or Z-direction depending upon orientation. (Author)
AD-659 053 HC$3.00 MF$0.65

A PROCESS FOR MEASURING THE VELOCITY VARIATION OF SHOCK WAVES USING MICROWAVES.
Institut Franco-allemand de Recherches, St. Louis (France).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 21.
N67-35464 HC$3.00 MF$0.65

NUMERICAL RESULTS FOR THE DIFFRACTION OF A NORMAL SHOCK WAVE BY A SPHERE AND FOR THE SUBSEQUENT TRANSIENT FLOW.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
R. W. Barnwell. Sep 67, 38p NASA-TR-R-268
Contract 129-01-08-18-23

Descriptors: *Diffraction, *Finite difference method, *Normal shock wave, *Sphere, *Transient response, Detachment, Flow, Gradient, History, Normal, Numerical, Point, Pressure, Response, Shock, Stagnation, Time, Transient, Velocity, Wave.

For abstract, see STAR 05 21.
N67-35723 HC$3.00 MF$0.65

HYPERSONIC AERODYNAMIC CHARACTERISTICS OF MINIMUM-WAVE-DRAG BODIES HAVING VARIATIONS IN CROSS-SECTIONAL SHAPE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 21.
N67-35728 HC$3.00 MF$0.65

AERODYNAMIC INVESTIGATION OF SOME HIGH-DRAG ENTRY SHAPES AT MACH 15.4.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 21.
N67-35730 HC$3.00 MF$0.65

APPLICATION OF LYAPUNOV STABILITY THEORY TO SOME NONLINEAR PROBLEMS IN HYDRODYNAMICS.
Pittsburgh Univ., Pa.
G. R. Buis, and W. G. Vogt. Sep 67, 23p NASA-CR-894
Grant NSG-39-011-039

Descriptors: *Equilibrium, *Hydrodynamic stability, *Liapunov function, Algebra, Analysis, Difference, Equation, Function, Hydrodynamics, Matrix, Nonlinearity, Operator, Property, Solution, Stability.

For abstract, see STAR 05 21.
N67-35738 HC$3.00 MF$0.65

LIQUID SLOSHING IN ELASTIC CONTAINERS.
Georgia Inst. of Tech., Atlanta.
H. F. Bauer, T.-M. Hsu, and J. T.-Wang. Sep 67, 38p NASA-CR-882
Contract NGR-11-002-028

Descriptors: *Incompressible fluid, *Liquid sloshing, Bottom, Container, Coupling, Cylinder, Elasticity, Fill, Fluid, Frequency, Incompressible, Liquid, Oscillation, Partial, Propellant, Rectangle, Sloshing, Tank, Wall.

For abstract, see STAR 05 21.
N67-35758 HC$3.00 MF$0.65

CORRELATION OF FRICTION COEFFICIENTS FOR LAMINAR AND TURBULENT FLOW WITH RATIOS OF SURFACE TO BULK TEMPERATURE FROM 0.35 TO 7.35.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
M. F. Taylor. Sep 67, 20p NASA-TR-R-267
Contract 122-28-02-16-22

Descriptors: *Friction coefficient, *Heat transfer, *Laminar flow, *Turbulent flow, Air, Bulk, Carbon dioxide, Coefficient, Correlation, Equation, Flow, Fluid, Friction, Heat, Helium, Hydrogen, Laminar, Nitrogen, Surface, Transfer, Tube, Turbulent.

For abstract, see STAR 05 21.
N67-35763 HC$3.00 MF$0.65

A VISUAL STUDY OF FORCED CONVECTION BOILING. PART 2 - FLOW PATTERNS AND BURNOUT FOR A ROUND TEST SECTION.
Atomic Energy Establishment, Winfrith (England). Reactor Development Div.
J. H. Kinneir, G. J. Kirby, and R. Staniforth. Mar 67, 30p AEEW-R-506

Descriptors: *Boiling, *Flow visualization, *Forced convection, Bubble, Burnout, Convection, Flow, Forced, Nucleate, Pattern, Round, Section, Subcooling, Test, Visualization.

For abstract, see STAR 05 21.
N67-35878 HC$3.00 MF$0.65

AERODYNAMIC STUDY OF STAGNATION ABLATION.
Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 21.
N67-36099 HC$3.00 MF$0.65

REPORTS AND TRANSACTIONS, VOLUME XXXII.
National Lucht-en Ruimtevaartlaboratorium, Amsterdam (Netherlands). National Aerospace Lab.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 21.
N67-36124 HC$3.00 MF$0.65

CONTRACTION COEFFICIENT OF JETS.
O Koeffitsiyente Suzheniya Struy
National Aeronautics and Space Administration. Washington, D. C.
YU. P.Ivanilov, and YE. V.Semenov. Aug 67, 8p NASA-TT-F-11150
Transl. Into English From Izv. Akad. Nauk Sssr, Mekhan. Zhidkosti Igaza (Moscow), No. 1, 1967 P 118-122

Descriptors: *Asymptotic function, *Contraction, *Exponential function, *Fluid jet, *Nozzle expansion, Asymptote, Coefficient, Expansion, Exponent, Fluid, Function, Jet, Law, Nozzle, Plane, Weightlessness.

For abstract, see STAR 05 21.
N67-36145 HC$3.00 MF$0.65

DETERMINATION OF STAGNATION TEMPERATURES IN THE R.A.R.D.E. HYPERSONIC GUN TUNNEL FROM STREAK CAMERA MEASUREMENTS OF FLOW VELOCITY.
Ministry of Technology, London (England). Aeronautical Research Council.

For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 21.
N67-36152 HC$3.00 MF$0.65

THE ACCURACY OF PRESSURE TRANSDUCERS WHEN USED IN SHORT-DURATION WIND-TUNNEL FACILITIES.
Ministry of Technology, London (England). Aeronautical Research Council.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 21.
N67-36153 HC$3.00 MF$0.65

A NEAR-FIELD APPROACH TO THE SONIC BOOM PROBLEM.
Boeing Co., Renton, Wash. Commercial Airplane Div.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 21.
N67-36403 HC$3.00 MF$0.65

EXPERIMENTS ON LARGE GAS BUBBLES IN LIQUIDS.
United Kingdom Atomic Energy Authority, Harwell (England). Atomic Energy Research Establishment.
R. Collins. Feb 67, 40p AERE-R-5402

Descriptors: *Bubble, *Cylinder, *Fluid boundary, *Liquid, Boundary, Curvature, Effect, Fluid, Gas, Velocity, Volume.

For abstract, see STAR 05 21.
N67-36445 HC$3.00 MF$0.65

SUPERSONIC FLOW PAST A FAMILY OF BLUNT AXISYMMETRIC BODIES.
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 1A.
PB-175 821 HC$3.00 MF$0.65

STABILITY OF A HORIZONTAL FLUID LAYER WITH UNSTEADY HEATING FROM BELOW AND TIME-DEPENDENT BODY FORCE.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 20M.
PB-175 824 HC$3.00 MF$0.65

TURBULENT BOUNDARY LAYER ON A YAWED CONE IN A SUPERSONIC STREAM.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 1A.
PB-175 826 HC$3.00 MF$0.65

CALCULATION OF AERODYNAMIC LOADING AND TWIST CHARACTERISTICS OF A FLEXIBLE WING AT MACH NUMBERS APPROACHING 1.0 AND COMPARISON WITH EXPERIMENT.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1C.
PB-175 849 HC$3.00 MF$0.65

SIMILARITY OF FAR NOISE FIELDS OF JETS.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 20A.
PB-175 853 HC$3.00 MF$0.65

APPROXIMATIONS FOR THE THERMODYNAMIC AND TRANSPORT PROPERTIES OF HIGH-TEMPERATURE AIR.
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 20M.
PB-175 855 HC$3.00 MF$0.65

STALL PROPAGATION IN A CASCADE OF AIRFOILS.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 1A.
PB-175 862 HC$3.00 MF$0.65

A METHOD OF SOLUTION WITH TABULATED RESULTS FOR THE ATTACHED OBLIQUE SHOCK-WAVE SYSTEM FOR SURFACES AT VARIOUS ANGLES OF ATTACK, SWEEP, AND DIHEDRAL IN AN EQUILIBRIUM REAL GAS INCLUDING THE ATMOSPHERE.
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 1A.
PB-175 864 HC$3.00 MF$0.65

A STUDY OF THE SIMULATION OF FLOW WITH FREE-STREAM MACH NUMBER 1 IN A CHOKED WIND TUNNEL.
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 1A.
PB-175 873 HC$3.00 MF$0.65

FLOW IN THE BASE REGION OF AXISYMMETRIC AND TWO-DIMENSIONAL CONFIGURATIONS.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 1A.
PB-175 877 HC$3.00 MF$0.65

ALIGNMENT CHARTS FOR TRANSPORT PROPERTIES VISCOSITY, THERMAL CONDUCTIVITY, AND DIFFUSION COEFFICIENTS FOR NONPOLAR GASES AND GAS MIXTURES AT LOW DENSITY.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 7D.
PB-175 886 HC$3.00 MF$0.65

TURBULENT SKIN FRICTION AT HIGH MACH NUMBERS AND REYNOLDS NUMBERS IN AIR AND HELIUM.
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 1A.
PB-175 887 HC$3.00 MF$0.65

20E. Masers and Lasers

SIMPLIFICATION OF HOLOGRAPHIC PROCEDURES,
Naval Training Device Center Port Washington N Y
For primary bibliographic entry see Field 14E.
AD-658 522 Not available from CFSTI.

A STUDY OF PHOTON LOSS IN THE ACTIVE AND PASSIVE REGIONS OF A SEMICONDUCTOR LASER.
Interim technical rept.,
Cornell Univ Ithaca N Y Materials Science Center
Robert G. Hunsperger. Jun 67, 148p Rept no. MSC-675
AROD-5560:3-E
Contract DA-31-124-ARO (D)-364

Descriptors: (*Semiconductor devices, Lasers), (*Lasers, Absorption), Gallium arsenides, Photons, Pumping (Electronics), Electron beams, Electron transitions, Band theory of solids, Carriers (Semiconductors).
Identifiers: Pumping (Electron beam).

Measurement and evaluation was made of the photon loss in the active and passive regions of a GaAs laser pumped by an electron beam. A theoretical expression was developed which gives the threshold current density required to produce lasing in an electron-beam-pumped laser when a portion of the length between Fabry-Perot surfaces was masked from the electron beam. This theoretical relation was experimentally verified by measurement of threshold current density as a function of masked length for numerous samples of GaAs at 4K. On the basis of these measurements the photon loss coefficients in the active and passive regions of the laser crystals were determined. The loss coefficients were found to be strongly dependent on impurity doping concentration. In addition the loss coefficient in the active region was observed to be less than the loss coefficient in passive material. This is attributed to an inhibiting of interband absorptive transitions by the inverted population in the active region. (Author)
AD-658 676 HC$3.00 MF$0.65

THERMAL EFFECTS IN OPTICALLY PUMPED LASER RODS.
Physical sciences research papers no. 193,
Air Force Cambridge Research Labs L G Hanscom Field Mass
R. L. Townsend, C. M. Stickley, and A. D. Maio.
6 Jul 65, 7p Rept no. AFCRL-66-82
Master's thesis.
Availability: Published in Applied Physics Letters v7 n4 p94-6 Aug 15 1965.

Descriptors: (*Pumping (Optical), Lasers), (*Lasers, Distortion), Ruby, Interferometers, Thermal properties, Temperature, Glass, Scattering.

The study was performed to clarify the role of thermal distortion on mode selection and beam divergence in optically pumped lasers. The experiment was designed to measure distortion and changes in optical length of ruby and neodymium glass laser rods both during and after excitation by the pump flash. A Twyman-Green interferometer was used to produce fringes, the fringe movement being correlated with changes in optical length. Movement and distortion of fringes was observed using a multi-frame image converter camera. The results show that all rods expand linearly with time during the time the pump is on and that all rods develop a distortion which is dependent on the radial energy density distribution within the rod. After the pump goes off, the rods begin a relaxation back to the unexcited state. The relaxation is interrupted when hot air propagates from the flash tube to the rod to reheat and become concave. The rod then relaxes slowly to the equilibrium state. It is concluded that the rod should be pumped while immersed in an index matching, infrared absorbing liquid to reduce these effects. (Author)
AD-658 677 Not available from CFSTI.

STABILITY MEASUREMENTS OF CO2-N2-He LASERS AT 10.6 MUm WAVELENGTH,
Massachusetts Inst of Tech Lexington Lincoln Lab
Charles Freed. 13 Feb 67, 3p Rept no. JA-2994A
ESD-TR-67-341
Contract AF 19 (628)-5167
Availability: Published in IEEE Journal of Quantum Electronics vQE-3 n5 p203-5 May 1967.

Descriptors: (*Lasers, Stability), Carbon dioxide, Nitrogen, Helium, Coherent radiation, Measurement.

The short-term stability of the beat frequency of two stable, single frequency, free-running and sealed-off lasers was measured. The best observation thus far indicates a spurious frequency mocu-

lation envelope width of less than 500 Hz for a period of several seconds. The frequency jitter is caused predominantly by environmental fluctuations and not by quantum noise. (Author)
AD-658 783 Not available from CFSTI.

OBSERVATION OF DEGENERATE STIMULATED FOUR-PHOTON INTERACTION AND FOUR-WAVE PARAMETRIC AMPLIFICATION,
Del Mar Engineering Labs Santa Monica Calif
For primary bibliographic entry see Field 20F.
AD-658 792 Not available from CFSTI.

PROPAGATION IN WAVEGUIDES FILLED WITH WARM PLASMA,
Case Inst of Tech Cleveland Ohio
For primary bibliographic entry see Field 9A.
AD-658 828 HC$3.00 MF$0.65

SELECTIVE ACCESS LASER DISPLAY BEAM POSITIONER.
Final rept. 1 Mar 66-30 Apr 67,
Hughes Research Labs Malibu Calif
James F. Lotspeich, James E. Kiefer, Wilbur P. Brown, Jr., and Neal H. Cosand. Aug 67, 105p
RADC-TR-67-381
Contract AF 30 (602)-4097

Descriptors: (*Lasers, Deflection), (*Viewing screens, Lasers), Electrooptics, Display systems, Prisms (Optics), Colors, Resolution, Ferroelectric crystals.

The experimental investigations and analytical studies indicate that controlled refractive deflection of laser beams by iterated electro-optic prism arrays of KD*P operated near the Curie temperature offers a promising approach to advancing the state of the art in high speed, selective access display applications.
AD-658 840 HC$3.00 MF$0.65

COHERENT LIGHT TRANSMITTER.
Final rept. 14 Dec 65-1 May 67,
Martin Co Orlando Fla
V. E. Derr. Sep 67, 67p Rept no. OR-8808
AFAL-TR-67-213
Contract AF 33 (615)-2022

Descriptors: (*Lasers, *Light transmission), Coherent radiation, Light, Optical properties, Excitation, Fluorescence, Efficiency, Absorption, Neodymium, Spectroscopy, Chromium, Theory, Rods, Optical instruments, Radiation damage.

The nuclear-pumped laser could, in theory, provide a small, efficient source of coherent optical radiation capable of many years of untended operation. The main deterrent to its realization is existence of the laser cutoff effect: quenching of laser action by high energy radiation. An hypothesis based on electron-induced superradiance is in agreement with the experiment. A low threshold laser material, YAG:Cr-Nd, has been found to resist this effect up to doses of 960 rads. (Author)
AD-658 858 HC$3.00 MF$0.65

SHOCK-WAVE-GENERATED PLASMAS AS LIGHT SOURCES FOR OPTICAL PUMPING,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
R. G. Buser, A. Papayoanou, and D. Ramm. 28 Apr 66, 7p
Availability: Published in Journal of Applied Physics v38 n1 p28-34 Jan 1967.

Descriptors: (*Pumping (Optical), *Lasers), (*Plasma medium, Pumping (Optical)), Plasma physics, Shock waves, Light, Sources, Ruby, Crystals.

Electrodeless discharges in coaxial tubes, capable of holding a laser crystal in the center, have been studied to obtain a measure of the energy coupled into the tube, to understand the dynamical processes, and to quantitatively determine the radiation emitted by the tube. The energy coupling and emitted radiation have been found to depend on the voltage stored on the capacitor, the primary coil dimensions, the fill gas and fill-gas pressure, and the tube dimensions. The dominant dynamical processes are those due to strong cylindrically imploding shock waves. Radiation emitted is found to be due to particles liberated from tube walls as well as that of the fill gas. Curves of radiation intensity vs wavelength, as well as spectral pictures and calculations of spectral matching coefficients, indicate the possibility of pumping very high powers into ruby crystals. (Author)
AD-658 935 Not available from CFSTI.

SURFACE TEMPERATURE AS A PARAMETER IN ESTIMATING LASER INJURY THRESHOLDS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6E.
AD-658 967 HC$3.00 MF$0.65

TEMPERATURE MEASUREMENTS IN EXPERIMENTAL TUMORS FOLLOWING EXPOSURE TO RUBY LASER ENERGY.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6E.
AD-658 975 HC$3.00 MF$0.65

THE EFFECT OF 3.39 MICRON SUPERRADIANCE ON THE 0.6328 MICRON OUTPUT POWER OF A HELIUM-NEON LASER.
Special technical rept.,
Minnesota Univ Minneapolis Dept of Electrical Engineering
John S. Hancock, and J. A. Carruthers. Aug 67, 35p Rept no. TR-1
AROD-6038:3-P
Contract DA-31-124-ARO (D)-402, ARPA Order-675

Descriptors: (*Lasers, Power), Helium, Neon, Infrared radiation, Reflection, Measurement.

The effect of competition in a 0.6328 micron helium-neon laser from the high-gain 3.39 micron line has been studied. The 50 milliwatt laser used for the investigation employs a six-foot Brewster-angle tube and has a prism at one end to insure that oscillation occurs only at 0.6328 microns. Measurements were made of the 3.39 micron superradiance from one end of the tube when various calibrated reflectors were placed at the other end. With a typical dielectric coated mirror, designed for maximum reflectivity at 0.6328 microns, the superradiant 3.39 micron power from the other end of the tube was 75 microwatts. This result shows that in a 6 foot visible laser filled with a 10:1, He (3)-Ne mixture and employing a single prism for frequency selection, the 3.39 micron superradiance does not significantly affect the visible output power. However, the superradiance is about 2 orders of magnitude larger than estimated from theory, and presumably results mainly from multiple reflections from the tube walls. (Author)
AD-659 005 HC$3.00 MF$0.65

RESEARCH IN THE FIELD OF HIGH RESOLUTION INFRARED SPECTROSCOPY.
Pennsylvania State Univ University Park Osmond Lab
For primary bibliographic entry see Field 20F.
AD-659 042 Not available from CFSTI.

DEVELOPMENT AND FABRICATION OF RING LASER SYSTEMS.
Perkin-elmer Corp., Norwalk, Conn.
P. H. Lee. Dec 66, 178p NASA-CR-88193, TR-8641
Contract NAS8-11669

Descriptors: *Gas laser, *Laser mode, *Optical sensor, Control, Fabrication, Gas, Laser, Mode, Neon, Optical, Performance, Resonator, Ring, Rotation, Sensor, System, Theory.

For abstract, see STAR 05 21.
N67-35629 HC$3.00 MF$0.65

R.R.E. NEWSLETTER AND RESEARCH REVIEW.
Royal Radar Establishment, Malvern (England). Ministry of Technology.
For primary bibliographic entry see Field 17I.
For abstract, see STAR 05 21.
N67-36063 HC$3.00 MF$0.65

THE UTILIZATION OF THE HOLOGRAPH IN THE AREA OF AERODYNAMICS.
Institut Franco-allemand de Recherches, St. Louis (France).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 21.
N67-36284 HC$3.00 MF$0.65

20F. Optics

SINGLE CRYSTAL PEROVSKITES AS ELECTROOPTICALLY ACTIVE MATERIALS.
Union Carbide Corp Indianapolis Ind Electronics Div
For primary bibliographic entry see Field 20B.
AD-658 461 HC$3.00 MF$0.65

SIMPLIFICATION OF HOLOGRAPHIC PROCEDURES,
Naval Training Device Center Port Washington N Y
For primary bibliographic entry see Field 14E.
AD-658 522 Not available from CFSTI.

REPORT ON WILD HEERBRUGG RANGEFINDER, 80cm BASE, 1944.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5E.
AD-658 579 HC$3.00 MF$0.65

THERMAL EFFECTS IN OPTICALLY PUMPED LASER RODS.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 20E.
AD-658 677 Not available from CFSTI.

LIGHT SCATTERING IN THE SEA,
Lamont Geological Observatory Palisades N Y
Edward M. Thorndike, and Maurice Ewing. 1967, 7p Rept no. Contrib-965
Contract Nonr-266 (48), Grant NSF-GA-550
Availability: Published in Society of Photo-Optical Instrumentation Engineers, Underwater Photo Optics Seminar p1-7 1966.

Descriptors: (*Underwater light, Scattering), (*Oceanology, Underwater light), Sea water, Underwater photography, Instrumentation, Ocean bottom, Detection, Optical images, Particle size, Sedimentation.

Nephelometers for making in situ measurements of light scattering at all depths from the surface to the bottom of the ocean are described. Preliminary results in the Atlantic, Pacific, and Arctic oceans and in the Bering and Caribbean seas are summarized. The materials present in sea water can be divided roughly into three parts on the basis of particle size: Objects that are much larger than the wavelength of light and so can be imaged and studied in detail visually or with underwater cameras. Suspended particles with sizes within a few orders of magnitude of the wavelength of light.

whose presence can be detected by the light that they scatter. Materials that are dissolved in sea water and can be investigated by the modifications in the absorption or refractive index that they produce. (Author)
AD-658 702 Not available from CFSTI.

OBSERVATION OF DEGENERATE STIMULATED FOUR-PHOTON INTERACTION AND FOUR-WAVE PARAMETRIC AMPLIFICATION,
Del Mar Engineering Labs Santa Monica Calif
R. L. Carman, R. Y. Chiao, and P. L. Kelley. 14 Nov 66. 4p Rept no. JA-2942
ESD-TR-67-305
Contract AF 19(628)-5167
Prepared in cooperation with Harvard Univ., Cambridge. Jefferson Physical Lab.
Availability: Published in Physical Review Letters v17 n26 p1281-2 Dec 26 1966.

Descriptors: (*Light, Scattering), Lasers, Photons, Interactions, Focusing, Boundary value problems, Electrooptics.

The observation of stimulated light-by-light scattering is reported for the case of coupling via the molecular-orientation Kerr effect. The boundary value problem is solved and the results are compared with the experiment. Also, the transition from light-by-light scattering into self-focusing has been observed and is discussed. (Author)
AD-658 792 Not available from CFSTI.

MEASUREMENT OF RELAXATION TIMES OF CONCENTRATION FLUCTUATIONS BY THE ELECTRIC FIELD ON CRITICAL OPALESCENCE,
Cornell Univ Ithaca N Y Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-658 801 Not available from CFSTI.

ELECTROREFLECTANCE STUDY OF INTERBAND MAGNETO-OPTICAL TRANSITIONS IN InAs AND InSb AT 1.5K.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20L.
AD-658 835 HC$3.00 MF$0.65

INFRARED RADIANCE OF SELECTED TERRAIN FEATURES AS VIEWED FROM HIGH ALTITUDE,
Denver Univ Colo Dept of Physics
David G. Murcray, Frank H. Murcray, and Walter J. Williams. Jul 67. 52p Rept no. Scientific-1
AFCRL-67-0448
Contract AF 19(628)-4797

Descriptors: (*Infrared spectroscopy, *Spectrometers), (*Balloons, Instrumentation), Infrared radiation, High altitude, Measurement, Blackbody radiation, Terrain, Emissivity.

A balloon flight was made July 8, 1966, with a downward looking spectral radiometer which measured the absolute spectral radiance of earth in the region from 8.5 to 16.0 microns as viewed from the balloon altitude. During the course of the flight the balloon traversed a number of different types of terrain. The observed spectral radiances show significant differences. Some of the differences appear to be due to changes in surface temperatures. There are a number of cases when the differences are definitely spectral in character and cannot be explained on the basis of temperature changes alone. It has not been possible however to associate the differences with any apparent geological parameter. (Author)
AD-658 866 HC$3.00 MF$0.65

SHOCK-WAVE-GENERATED PLASMAS AS LIGHT SOURCES FOR OPTICAL PUMPING,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20E.
AD-658 935 Not available from CFSTI.

QUANTUM OPTICS. I. EXCITATION OF A DAMPED RADIATION MODE BY WEAKLY COUPLED SOURCES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
I. R. Senitzky. 28 Oct 66. 17p
Availability: Published in Physical Review v155 n5 p1387-1403 Mar 25 1967.

Descriptors: (*Optics, Quantum mechanics), Vacuum, Perturbation theory, Correlation techniques, Blackbody radiation, Theorems, Excitation.

The isolation usually encountered in optics between the part of a field that is of interest and its source motivates the consideration of a radiation mode weakly coupled to a quantum-mechanical source. After the introduction of some refinements into the quantum mechanics of a damped radiation mode, the field is expressed as the sum of two parts, one due to the source (the source field) and the other due to the loss mechanism (the 'vacuum' field). The characteristic function for the field is calculated up to second order in perturbation theory. This function is then compared with the characteristic function for the field in the presence of a classical source. A method is exhibited by which a classical source can be found such that the two characteristic functions are identical when averaged over a half cycle. In particular, the two sources yield the same expectation values for the instantaneous amplitude and energy of the field. The description of the equivalent classical source must be given in statistical terms, in general, and requires only a knowledge of $\langle S(0)(t)\rangle$ and $\langle S(0)(t_1)S(0)(t_2)\rangle$, where S (0) is the dipole-moment operator of the quantum-mechanical source unperturbed by the mode under consideration (but otherwise arbitrarily complex, with the possibility of strong coupling to other modes). The theory is illustrated by a consideration of several simple sources--a two-level system, a harmonic oscillator, and a blackbody--for which equivalent classical sources are found. (Author)
AD-658 937 Not available from CFSTI.

MEGAWATT LINE RADIATOR USING SEQUENTIAL INDUCTIVE DISCHARGES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20I.
AD-658 938 Not available from CFSTI.

CORED CATHODE FOR STABILIZATION OF THE dc ARC,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 14B.
AD-658 950 Not available from CFSTI.

SPECTRUM OF Sm III,
Johns Hopkins Univ Baltimore Md
For primary bibliographic entry see Field 7D.
AD-658 954 Not available from CFSTI.

ELECTRIC FIELD EFFECT ON THE CRITICAL OPALESCENCE. II. RELAXATION TIMES OF CONCENTRATION FLUCTUATIONS,
Cornell Univ Ithaca N Y Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-658 959 Not available from CFSTI.

SPECTRUM OF Ho III,
Johns Hopkins Univ Baltimore Md
For primary bibliographic entry see Field 7D.
AD 659 000 Not available from CFSTI.

RESEARCH IN THE FIELD OF HIGH RESOLUTION INFRARED SPECTROSCOPY.
Final rept. 1 Nov 63-31 Oct 66,
Pennsylvania State Univ University Park Osmond Lab
Thomas K. McCubbin, Jr. 31 Jan 67. 70p
AFCRL-67-0437
Contract AF 19(628)-3846
Availability: Published in Various journals.

Descriptors: (*Infrared spectroscopy, Instrumentation), (*Molecular spectroscopy, Spectra (Infrared)), (*Lasers, Infrared spectroscopy), Spectrometers, Carbon dioxide, Nitrogen oxides, Line spectrum, Band spectrum, Coherent radiation, Gas lasers.

Infrared spectroscopic apparatus described in AD-602 493 was further developed and it was used to investigate the spectra of CO2 and N2O. A study of the infrared amplification of the helium neon laser was made and radiation from the N2-CO2 laser was used to measure the strengths and widths of absorption lines in the 10.6 micron band of CO2. The coherent and incoherent modes of laser illumination of a spectrometer were studied. Four reprints are included with the basic text: 'The 02 (2)0-01 (1)0 band of (14)N2 (16)O'. J. Optical Soc. Am. v54 p956 1964; 'Infrared vacuum grating-prism spectrometer'. App. Optics v4 p711 1965; 'Determination of vibration-rotational line strengths widths in CO2 using a CO2-N2 laser'. App. Phys. Letters v8 p118 1966; 'Study of helium-neon amplification at 3.39 microns'. App. Optics v4 p1412 1965.
AD-659 042 Not available from CFSTI.

OPTICAL IMAGERS FOR THE SMALL EARTH RESOURCES SATELLITE.
IIT Research Inst., Chicago, Ill. Astro Sciences Center.
S. S. Verner. Apr 67. 53p NASA-CR-88212, TM-21
Contract NASR-65/10/

Descriptors: *Camera, *Electro-optics, *Optical image, *Satellite photography, Acquisition, Characteristics, Earth, Image, Optical, Parameter, Performance, Photography, Physical, Resource, Satellite.

For abstract, see STAR 05 21.
N67-36064 HC$3.00 MF$0.65

CALIBRATION STANDARDS FOR PHOTON SPECTROSCOPY BETWEEN 20-200 KE V.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 21.
N67-36459 HC$3.00 MF$0.65

LIGHT SOURCES FOR REMOTE SENSING SYSTEMS.
IIT Research Inst., Chicago, Ill.
M. W. Cann. Aug 67. 162p NASA-CR-854
Contract NAS8-20107

Descriptors: *Arc lamp, *Electric discharge, *Incandescence, *Light source, *Sensor, Arc, Brightness, Discharge, Distribution, Electric, Emission, Intensity, Lamp, Lifetime, Light, Remote, Source, Spectral, Stability, Uniform.

For abstract, see STAR 05 21.
N67-36490 HC$3.00 MF$0.65

AN INVESTIGATION OF THE EFFECT OF HIGH TEMPERATURE ON THE SCHUMANN-RUNGE ULTRAVIOLET ABSORPTION CONTINUUM OF OXYGEN.
National Aeronautics and Space Administration. Langley Station, Va. Langley Research Center.

For primary bibliographic entry see Field 7D.
PB-175 896 HC$3.00 MF$0.65

REFLECTION OF POLARIZED LIGHT FROM FILM-COVERED SURFACES,
California Univ., Berkeley. Lawrence Radiation Lab.
J. Richard Mowat, and Rolf H. Muller. Feb 67, 70p
Contract W-7405-eng-48

Descriptors: (*Light transmission, Polarization), (*Films, Optical properties), Refractive index, Surfaces, Metals, Thickness, Reflection, Electric fields.

For abstract, see NSA 21 19.
UCRL-17128 HC$3.00 MF$0.65

20G. Particle Accelerators

USE OF COMPUTERS IN ANALYSIS OF EXPERIMENTAL DATA AND THE CONTROL OF NUCLEAR FACILITIES.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
CONF-660527 HC$3.00 MF$0.65

A STUDY OF THE FEASIBILITY OF TRANSPORTING THE BEAM FROM THE 50 ME V PLA FOR INJECTION INTO NIMROD.
Gt. Brit. National Inst. for Research in Nuclear Science, Chilton. Rutherford High Energy Lab.
C. W. Planner. Dec 66, 35p RHEL/R-141

Descriptors: *Linear accelerator, *Nimrod accelerator, *Proton beam, *Transportation, Accelerator, Beam, Charge, Energy, Feasibility, Increase, Injection, Limitation, Linear, Profile, Proton, Space, Synchrotron, System.

For abstract, see STAR 05 21.
N67-36287 HC$3.00 MF$0.65

NIMROD OPERATION AND DEVELOPMENT QUARTERLY REPORT, SEP. 20 - DEC. 31, 1966.
National Inst. for Research in Nuclear Science, Harwell (England). Rutherford High Energy Lab.
D. E. Gray. Feb 67, 12p RHEL/R-142, QR-1

Descriptors: *Nimrod accelerator, *Servomechanism, Beam, Coherent, Damping, Equipment, Harmonic, Magnetic, Noise, Operation, Oscillation, Ripple, Spill, Waveform.

For abstract, see STAR 05 21.
N67-36486 HC$3.00 MF$0.65

FATIGUE TESTS ON PRESSURISED MEMBRANES OF POLYETHYLENE TEREPHTHALATE.
National Inst. for Research in Nuclear Science, Harwell (England). Rutherford High Energy Lab.
For primary bibliographic entry see Field 11I.
For abstract, see STAR 05 21.
N67-36488 HC$3.00 MF$0.65

INSTRUMENTATION AND CONTROLS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 1, 1966.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 19.
ORNL-4091 HC$3.00 MF$0.65

SUMMARIES OF RESEARCH IN HIGH ENERGY PHYSICS.
Division of Research (AEC), Washington, D. C.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 19.
TID-4005-Pt-6-Rev HC$3.00 MF$0.65

BEVATRON OPERATION AND DEVELOPMENT. 52, SEPTEMBER-DECEMBER 1966,
California Univ., Berkeley. Lawrence Radiation Lab.
Kenneth C. Crebbin, and Robert Frias. 23 May 67, 12p
Contract W-7405-eng-48

Descriptors: (*Bevatrons, Operation), (*Particle accelerators, *Proton beams), Reactor shutdown, Bubble chambers, Reactor operation, Nuclear engineering.

For abstract, see NSA 21 19.
UCRL-17402 HC$3.00 MF$0.65

THEORY OF THE RF MANIFOLD AND MEASUREMENTS ON A MODEL MANIFOLD SYSTEM,
California Univ., Berkeley. Lawrence Radiation Lab.
Ferdinand Voelker. Apr 67, 51p
Contract W-7405-eng-48

Descriptors: (*Linear accelerators, Voltage), (*Synchrotrons, Radiofrequency), Amplifiers, Voltage regulators.

For abstract, see NSA 21 19.
UCRL-17508 HC$3.00 MF$0.65

BEVATRON OPERATION AND DEVELOPMENT. 53, JANUARY-MARCH 1967,
California Univ., Berkeley. Lawrence Radiation Lab.
Robert W. Allison, Kenneth C. Crebbin, and Robert Frias. 2 Jun 67, 12p
Contract W-7405-eng-48

Descriptors: (*Bevatrons, Operation), (*Particle accelerators, *Proton beams), Reactor shutdown, Maintenance, Construction, Shielding, Reactor operation, Nuclear engineering.

For abstract, see NSA 21 19.
UCRL-17543 HC$3.00 MF$0.65

STATITRON A LOW-ENERGY PULSED ELECTRON ACCELERATOR,
California Univ., Livermore. Lawrence Radiation Lab.
D. R. Lasher. 14 Mar 67, 36p

Descriptors: (*Electron accelerators, Design), (*Electron guns, Operation), Maintenance, Electronic equipment, Radiation measurement systems.

For abstract, see NSA 21 19.
UCRL-50215 HC$3.00 MF$0.65

20H. Particle Physics

TWO AND THREE PARTICLE COULOMB SYSTEMS,
Pittsburgh Univ Pa Space Research Coordination Center
For primary bibliographic entry see Field 20J.
AD-658 540 HC$3.00 MF$0.65

THE HALF-LIFE AND MASS OF 43Ti,
Florida State Univ Tallahassee Dept of Physics
For primary bibliographic entry see Field 18H.
AD-658 662 Not available from CFSTI.

OPTICAL PARAMETERS FOR THE ELASTIC SCATTERING OF 3He BY 4He,
Florida State Univ Tallahassee Dept of Physics
F. Dunnill, T. J. Gray, H. T. Fortune, and N. R. Fletcher. 25 Jul 66, 9p
AFOSR-67-2188
Grant AF-AFOSR-440-67
Availability: Published in Nuclear Physics vA93 p201-8 1967.

Descriptors: (*Helium, *Elastic scattering), (*Alpha particles, Elastic scattering), Differential cross section, Nuclear models, Potential scattering, Particle beams.

Angular distributions of the elastic scattering of 3He by 4He over an angular range of 30 to 150 degrees were measured for five 3He bombarding energies from 12.0 to 19.0 MeV. A simple optical model with and without a spin-orbit potential was used to fit the angular distributions. In the resonance free region above 13.5 MeV bombarding energy the optical parameters vary little from U = 100 MeV and W = 10 MeV. These values are more characteristic of alpha-particle scattering than of 3He scattering. The spin-orbit potential of about 20 MeV is much larger than that found with heavier targets. (Author)
AD-658 666 Not available from CFSTI.

MAGNETIC COMPRESSION OF ELECTRON BEAMS.
Hughes Research Labs Malibu Calif
For primary bibliographic entry see Field 9A.
AD-658 680 HC$3.00 MF$0.65

SCATTERING OF HIGH-VELOCITY NEUTRAL PARTICLES. XV. He-H2.
Massachusetts Inst of Tech Cambridge Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-658 758 Not available from CFSTI.

ALMOST 'HEAD-ON' COLLISIONS IN THE SCATTERING OF FAST ARGON ATOMS BY HYDROGEN ISOTOPES.
Massachusetts Inst of Tech Cambridge Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-658 759 Not available from CFSTI.

ANALYSIS OF ELASTIC-SCATTERING DATA IN THE SEMICLASSICAL APPROXIMATION,
Brown Univ Providence R I
For primary bibliographic entry see Field 7D.
AD-658 916 Not available from CFSTI.

AMBIGUITIES IN THE OPTICAL-MODEL ANALYSIS OF ALPHA-PARTICLE SCATTERING,
Florida State Univ Tallahassee Dept of Physics
W. J. Thompson, G. E. Crawford, and R. H. Davis. 3 Mar 67, 16p
AFOSR-67-2181
Grants AF-AFOSR-440-67, NSF-GP-5114
Availability: Published in Nuclear Physics vA98 p228-40 1967.

Descriptors: (*Alpha particles, *Elastic scattering), (*Nuclear models, Alpha particles), (*Magnesium, Alpha particles), Potential theory, Differential cross section, Wave functions, Phase shift.
Identifiers: Optical nuclear models.

The phase-equivalent discrete ambiguities in the complex potential parameters which are obtained from optical-model analysis of alpha-particle elastic scattering differential cross sections are examined. A detailed analysis of the scattering of 10.8 MeV alpha particles by 24Mg is used to illustrate the discussion of these ambiguities. In principle, one technique for the reduction of the ambiguities is the coupled-equations analysis of two or more channels, and this is applied to the example data.

Cluster-model information about the bound states also provides a basis for a choice. These analyses suggest that the real part of the optical-model potential for alpha particles is between 150 and 200 MeV. (Author)
AD-658 922 Not available from CFSTI.

ISOBARIC ANALOGUE STATES IN HEAVY NUCLEI. IV. SAMARIUM ISOTOPES,
Florida State Univ Tallahassee Dept of Physics
R. K. Jolly, and C. F. Moore. 21 Oct 66, 8p
AFOSR-67-2193
Grant AF-AFOSR-440-67
See also AD-640 834.
Availability: Published in the Physical Review v155 n4 p1377-82 Mar 20 1967.

Descriptors: (*Samarium, *Nuclear isobars), (*Proton bombardment, Samarium), Nuclear resonance, Nuclear spectroscopy, Proton scattering, Nuclear energy levels, Excitation, Potential scattering, Elastic scattering.

Isobaric analogue resonances in the target-nucelus-plus-proton system were studied for the target nuclei of Sm144, Sm148, Sm150, Sm152, Sm154. All resonances were observed via elastic proton scattering, while some resonances for the target nuclei of Sm144 and Sm148 were also observed via (p,n) reactions. The low-lying resonances were analyzed using a single-resonance formula yielding the various resonance parameters. Results are compared with (d,p) and other studies on the neutron-plus-target analogue states. Coulomb displacement energies are presented. (Author)
AD-658 923 Not available from CFSTI.

AN EXTENSION OF THE PATH-LENGTH FORMALISM TO ANISOTROPIC CHARGED-PARTICLE SOURCES.
Technical notes.
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
E. E. Lewis. 19 Aug 66, 2p
Availability: Published in Nuclear Science and Engineering v28 p301-12 1967.

Descriptors: (*Charged particles, Sources), Emissivity, Probability, Configuration, Neutron flux, Monte Carlo method.

In AD-640 740 the Dirac method of chords was used to determine the escape probability for heavy-charged particles emitted from a uniform isotropic source of arbitrary convex geometry. The restriction of isotropy is now removed to yield path-length distributions as a function of angle. This extension permits the formalism to be used either analytically or in conjunction with Monte Carlo methods to treat problems that involve uniform but anisotropic sources of heavy-charged particles. Such problems arise, for example, in determining edge effects for several types of neutron detectors.
AD-658 949 Not available from CFSTI.

TOWERS AS SETS OF COMPOSITE PARTICLES AND TROUBLE WITH INFINITE-COMPONENT FIELD THEORIES,
Institute for Advanced Study Princeton N J
For primary bibliographic entry see Field 20J.
AD-658 965 Not available from CFSTI.

THE n-n SCATTERING LENGTH, THE THREE-BODY PROBLEM AND CHARGE SYMMETRY,
New South Wales Univ Kensington (Australia) Dept of Applied Mathematics
K. Okamoto, and C. Lucas. 19 Dec 66, 6p
AFOSR-67-2194
Grant AF-AFOSR-685-66
Availability: Published in Il Nuovo Cimento v48 Ser10 p233-6 Mar 1 1967.

Descriptors: (*Nuclear forces, Measurement), (*Neutron scattering, Nuclear forces), Alpha particles, Interactions, Potential energy, Australia.
Identifiers: Symmetry (Quantum mechanics).

It is shown that the discrepancy between the Coulomb energy of 3He and the binding-energy difference between 3H and 3He can reasonably be explained by charge-asymmetric nuclear forces due to electromagnetic mixings of various mesons, and is also consistent with the experimental data on the n-n scattering length. (Author)
AD-659 011 Not available from CFSTI.

NOTE ON THE EXISTENCE OF THE TRINEUTRON,
New South Wales Univ Kensington (Australia) Dept of Applied Mathematics
K. Okamoto, and B. Davies. 1 Dec 66, 6p
AFOSR-67-2195
Grant AF-AFOSR-685-66
Availability: Published in Physics Letters v24B n1 p18-21 Jan 9 1967.

Descriptors: (*Neutrons, Nuclear binding energy), Nuclei, Theory, Potential energy, Wave functions, Australia.
Identifiers: Bound particles, Trineutrons.

The possibility of a bound trineutron (3n) is investigated by a variational technique, and 3n is found to be unbound. The systematics of the last neutron separation energies also support this conclusion. (Author)
AD-659 012 Not available from CFSTI.

SCATTERING FROM LOW-DENSITY DIELECTRIC BODIES.
Northwestern Univ Evanston Ill Information-Processing and Control Systems Lab
For primary bibliographic entry see Field 20C.
AD-659 019 Not available from CFSTI.

A SEARCH FOR MASSIVE PARTICLES IN COSMIC RAYS.
Technical rept.,
Michigan Univ Ann Arbor Office of Research Administration
Lawrence W. Jones, Bruce Cork, B. Dayton, A. Benvenuti, and P. D. Kearney. Jul 67, 49p Rept no. TR-29, 03106-29-T
Contract Nonr-1224 (23)
Prepared in cooperation with Wisconsin Univ., Madison., Lawrence Radiation Lab., Berkeley, Calif., California State College, Los Angeles, Minnesota Univ., Minneapolis, Colorado State Univ., Fort Collins, and Midwestern Universities Research Association, Stoughton, Wis.
Availability: Submitted for publication in Physical Review 49p nd.

Descriptors: (*Cosmic rays, Energy), Nuclear particles, Nuclei, Radiation measurement systems, Resolution, Nuclear cross sections.

A search for heavy particles with a mass greater than that of a nucleon, the existence of which has been suggested by higher symmetry schemes, was performed with an apparatus set up at Echo Lake, Colorado (elevation 10,600 ft). The search was sensitive to strongly interacting particles with masses in the range 5-15 BeV, with no restriction imposed on their electric charge. The method used was to measure the time interval between the arrival of strongly interacting particles and accompanying air shower particles. This information, coupled with information from a measurement of the particle's energy and range of absorption in a total absorption spectrometer, enabled a distinction to be made between massive elementary particles, nucleons, and nuclei. In an operating period of 1542 hours and with an aperture of 0.78 sq. m sr, one delayed event was found whose behavior in the total absorption spectrometer was atypical of a nucleon or nucleus. If one considers this event to represent the arrival of a massive particle then its mass, calculated assuming that its production occurred 1 km above the apparatus, is approximately 6.5 BeV. This one event corresponds to a flux of the order of 10 to the -10th power/ (sq cm sec sr), where a correction for detection efficiency is included. (Author)
AD-659 049 Not available from CFSTI.

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON FAST CRITICAL EXPERIMENTS AND THEIR ANALYSIS HELD AT ARGONNE NATIONAL LABORATORY, ILLINOIS, OCTOBER 10-13, 1966.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
ANL-7320 HC$3.00 MF$0.65

TABLES OF ELECTRON WAVEFUNCTIONS AND ASSOCIATED DATA,
Brookhaven National Lab., Upton, N. Y.
E. L. Church. Dec 66, 119p

Descriptors: (*Wave functions, *Electrons), (*Internal conversion, Tables), Penetration, Electron capture, Nuclei, Nuclear models.

For abstract, see NSA 21 19.
BNL-50002 HC$3.00 MF$0.65

USE OF COMPUTERS IN ANALYSIS OF EXPERIMENTAL DATA AND THE CONTROL OF NUCLEAR FACILITIES.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 19.
CONF-660527 HC$3.00 MF$0.65

COMPTON SCATTERING FACTORS FOR SPHERICALLY SYMMETRIC FREE ATOMS,
Los Alamos Scientific Lab., N. Mex.
Don T. Cromer, and Joseph B. Mann. 3 May 67, 116p
Contract W-7405-eng-36

Descriptors: (*Compton scattering, *Wave functions), (*Nuclear reactions, *Hartree-Fock approximation), Incoherent scattering, Computer programs.

For abstract, see NSA 21 19.
LA-3689 HC$3.00 MF$0.65

X-RAY WAVELENGTH CONVERSION TABLES AND GRAPHS FOR QUALITATIVE ELECTRON PROBE MICROANALYSIS.
National Bureau of Standards, Washington, D. C. Analytical Chemistry Div.
For primary bibliographic entry see Field 7B.
NBS-TN-406 HC$0.70 MF$0.65

TABLES OF MAXIMUM ENERGIES OF CHARACTERISTIC BETA-DECAY.
Tabelle Wichtiger Beta-maximalenergien
National Aeronautics and Space Administration, Washington, D. C.
V. Loessner. Sep 67, 35p NASA-TT-F-11203
Transl. Into English From Staatliche Zentrale Fur Strahlenschutz (Berlin), Apr. 1966

Descriptors: *Beta radiation, *Radioactive decay, *Table, Beta, Decay, Energy, Isotope, Maximum, Nuclide, Radiation, Radioactivity.

For abstract, see STAR 05 21.
N67-35648 HC$3.00 MF$0.65

DIFFERENTIAL CROSS SECTIONS FOR (D, ALPHA) REACTION ON SCANDIUM 45.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

J. R. Priest, and J. S. Vincent. Sep 67, 13p
NASA-TN-D-4140
Contract 129-02-04-06-22

Descriptors: *Calcium, *Deuteron, *Nuclear reaction, *Scandium, Alpha, Cross section, Differential, Excitation, Ground, State, Transition.

For abstract, see STAR 05 21.
N67-35665 HC$3.00 MF$0.65

DIFFUSION OF SOLAR COSMIC RAYS AND THE POWER SPECTRUM OF THE INTERPLANETARY MAGNETIC FIELD.
State Univ. of Iowa, Iowa City. Dept. of Physics and Astronomy.
K. V. Nathan, and J. A. Van Allen. Aug 67, 8p
NASA-CR-88208, REPT.-67-43
Grant NSG-233-62

Descriptors: *Electron diffusion, *Interplanetary magnetic field, *Power spectrum, *Solar cosmic ray, Coefficient, Constant, Cosmic, Density, Diffusion, Electron, Equation, Field, Frequency, Interplanetary, Magnetic, Particle, Power, Proton, Ray, Solar, Spectrum, Structure, Velocity.

For abstract, see STAR 05 21.
N67-35866 HC$3.00 MF$0.65

CHARGED PARTICLE ENERGIZATION BY AN ARBITRARILY MOVING MAGNET.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
T. J. Birmingham, and T. G. Northrop. Aug 67, 15p NASA-TM-X-55909, X-641-67-404

Descriptors: *Charged particle, *Kinetic energy, *Magnetic field, *Trapped particle, Adiabat, Arbitrary, Charge, Conducting, Energy, Field, Kinetic, Magnet, Magnetic, Motion, Particle, Theory, Trapping.

For abstract, see STAR 05 21.
N67-35888 HC$3.00 MF$0.65

SLOW-ELECTRON SCATTERING BY STRONGLY POLAR MOLECULES.
Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 21.
N67-35955 HC$3.00 MF$0.65

EXCHANGE EFFECTS IN THE DEGENERATE PERTURBATION THEORY OF INTERMOLECULAR POTENTIALS.
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
D. A. Micha. 31 Jul 67, 25p NASA-CR-88189, WIS-TCI-244
Grant NSG-275-62

Descriptors: *Molecular interaction, *Perturbation theory, *Quantum mechanics, Atom, Collision, Differential, Effect, Eigenvalue, Electron, Energy, Equation, Exchange, Function, Interaction, Mechanics, Molecular, Molecule, Perturbation, Potential, Theory, Wave.

For abstract, see STAR 05 21.
N67-35985 HC$3.00 MF$0.65

MOLTEN-SALT REACTOR PROGRAM SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING FEBRUARY 28, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 19.
ORNL-4119 HC$3.00 MF$0.65

FINAL STATUS REPORT TO THE NATIONAL SCIENCE FOUNDATION, JANUARY 1, 1966 - JUNE 15, 1967.
Cornell Univ., Ithaca, N. Y. Center for Radiophysics and Space Research.
For primary bibliographic entry see Field 3B.
PB-175 945 HC$3.00 MF$0.65

SUMMARIES OF RESEARCH IN HIGH ENERGY PHYSICS.
Division of Research (AEC), Washington, D. C.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 19.
TID-4005-Pt-6-Rev HC$3.00 MF$0.65

BISE A TWO-VERTEX KINEMATIC PROGRAM,
California Univ., Berkeley. Lawrence Radiation Lab.
Harold Hanerfeld. 28 Mar 67, 31p
Contract W-7405-eng-48

Descriptors: (*Programming (Computers), Least squares method), (*Bubble chambers, Numerical analysis), Partial differential equations, Taylor's series, Accuracy, Momentum, Magnetic fields.

For abstract, see NSA 21 19.
UCRL-17473 HC$3.00 MF$0.65

TRANSMISSION OF 14-MEV NEUTRONS IN LIQUID NITROGEN,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 19.
UCRL-50259 HC$3.00 MF$0.65

20I. Plasma Physics

ELECTRIC ARC DISCHARGES IN TRANSVERSE MAGNETIC FIELDS. PART I,
Aerospace Research Labs Wright-Patterson AFB Ohio
Herbert O. Schrade. Jun 67, 121p Rept no. ARL-67-0119

Descriptors: (*Electric discharges, *Magnetic fields), Plasma physics, Electric arcs, Arc heaters, Magnetohydrodynamics, Vortices, Drag, Test facilities, Motion.
Identifiers: Retrograde motion (Plasma physics).

The dynamic behavior of electric arc discharge columns, which are subjected to transverse external magnetic fields, was studied through an analysis of all the forces acting normal to a segment of the arc column. This analysis led to an explanation of 'magnetic arc pumping' which was found to be the cause of arc retrograde motion as well as the discontinuous motion of electrode attachment points. It is shown that a gasdynamic force is generated through the combined action of the self-induced magnetic field of a current-carrying plasma and of a superimposed external magnetic field. This force opposes the Lorentz force generated by the external field; it is the reaction force of a hydromagnetically induced transverse gas flow which is generated within the current-carrying channel. Arc pumping and associated phenomena may also occur in the absence of an external magnetic field if the arc column is curved. This is explained by the fact that the distribution of Lorentz forces on a curved arc column is comparable to that on a straight arc column in a transverse magnetic field. (Author)
AD-658 459 HC$3.00 MF$0.65

THE KINETIC THEORY OF A PLASMA IN THE PRESENCE OF STRONG MAGNETIC FIELDS. I: GENERAL THEORY,
Aeronautical Research Associates of Princeton Inc N J
S. Radin, Arnold H. Kritz, and G. Sandri. Jul 67, 35p
ARL-67-0150
Contract AF 33 (615)-1910

Descriptors: (*Kinetic theory, *Plasma medium), Magnetic fields, Electron density, Distribution functions, Statistical functions, Statistical mechanics.

We obtain, from the BBGKY hierarchy of equations, the kinetic equation for the single-particle electron distribution function for a plasma in a strong magnetic field. The derivation is carried out by means of the method of extension developed previously. It is applicable to magnetic flux densities of strength up to 0.003 (the square root of (n/cc)) gauss (where n is the electron number density), a situation often occurring in laboratory and astrophysical plasmas. The kinetic equation describes weakly inhomogeneous and nongyrotrophic plasmas in the Landau (small momentum transfer) approximation. (Author)
AD-658 460 HC$3.00 MF$0.65

RESEARCH ON ELECTROMAGNETICS FOR PROJECT DEFENDER.
Semiannual technical summary rept.,
Professional Design Co Agawam Mass
Rudolf G. E. Hutter. 31 Mar 67, 25p
PIBMRI-1295.4-67
Contract Nonr-839 (38), ARPA Order-529

Descriptors: (*Plasmas physics, Scientific research), (*Fluid mechanics, Scientific research), (*Wave transmission, Scientific research), Abstracts, Plasma sheath, Microwaves, Heating, Kinetic theory, Langmuir probes, Wake, Shock waves, Stability, Scattering, Measurement, Electron density, Cerenkov radiation, Propagation.
Identifiers: Defender project.

The report contains a complilation of abstracts of papers on the subjects of Plasmas, Fluid Dynamics and Electromagnetics.
AD-658 518 HC$3.00 MF$0.65

RELAXATION TO EQUILIBRIUM OF A DILUTE ELECTRON PLASMA,
Michigan Univ Ann Arbor Dept of Aerospace Engineering
J. B. McLeod, and R. S. B. Ong. 21 Apr 66, 11p
AFOSR-67-1903
Grant AF-AFOSR-825-65
Prepared in cooperation with Oxford Univ. (England) and UKAEA Culham Lab., Berkshire (England).
Availability: Published in Journal of Mathematical Physics v8 n2 p240-7 Feb 1967.

Descriptors: (*Electrons, Plasma physics), (*Plasma medium, Relaxation time), Kinetic theory, Interactions, Distribution functions, Operators (Mathematics).

The relaxation of the velocity distribution to equilibrium in an electron plasma in which the dominant collisions are described by the Fokker-Planck operator is studied. It is shown mathematically that the linearized collision operator possesses a continuous spectrum of eigenvalues which extends over the entire real interval from zero to infinity. Consequently the decay to equilibrium is not uniformly exponential. For large values of the time the decay to Maxwellian is shown to be of the order of the inverse power of the time variable. Moreover the rate of decay depends also on the initial perturbation. (Author)
AD-658 612 Not available from CFSTI.

A MODEL FOR THE GENERATION OF MAGNETOHYDRODYNAMIC WAVES BY HIGH-ALTITUDE NUCLEAR BURSTS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 18C.
AD-658 716 HC$3.00 MF$0.65

THE EFFECTS OF WATER VAPOR ON THE ELECTRON DENSITY OF SHOCK HEATED AIR,
Naval Ordnance Lab White Oak Md
P. M. Aronson, and David Levine. 4 Jan 67, 19p
Rept no. NOLTR-67-79, Ballistics Research-173

Descriptors: (*Shock waves, Electron density), (*Plasma sheath, Water vapor), Air, Gas ionization, Electrons, Interactions, Shock tubes, Atmosphere entry, Radar echo areas.

The electron density and collision frequency of air-water mixtures heated in a reflected shock wave zone were compared with the electron density and collision frequency for dry air similarly conditioned. Amounts of water vapor up to 10 percent have only slight effect on the electron density, and no detectable effect on the measured collision frequency. (Author)
AD-658 719 HC$3.00 MF$0.65

WAVE-WAVE INTERACTION BETWEEN TRANSVERSE PLASMA OSCILLATIONS,
Alberta Univ Edmonton Dept of Physics
Som Krishan. Mar 67, 12p
Contract Nonr-4072 (00)

Descriptors: (*Plasma oscillations, Interactions), Emissivity, Absorption, Quantum mechanics, Interactions, Cyclotron resonance phenomena.
Identifiers: Plasmons.

The non-linear wave-wave interaction between parallel transverse plasma waves is studied in terms of emission and absorption of plasmons. In the collective oscillation limit (k sq.)< (omega-p sq.)/ (c sq.), the parallel waves do not interact. (Author)
AD-658 738 HC$3.00 MF$0.65

POWER TRANSFER TO FINITE PLASMAS NEAR THE LOWER HYBRID RESONANCE.
Technical rept.,
Texas Univ Austin Plasma Physics Lab
M. E. Oakes, H. Schluter, and R. Skipping. Jul 67, 9p
AROD-6398:4-P, ORD-3110-9
Grant DA-ARO (D)-31-124-G805
Availability: Published in Physics Letters.

Descriptors: (*Cyclotron resonance phenomena, Dispersion relations), Power, Transport properties, Refractive index, Mathematical analysis.

The feature of dispersion relations in the range of the lower hybrid resonance in the case of finite plasma cylinders are discussed. The possibility of two optima in the power transfer or of a broad transfer band is pointed out. (Author)
AD-658 779 Not available from CFSTI.

RECENT ADVANCES IN AEROTHERMOCHEMISTRY, VOLUME I.
Advisory Group for Aerospace Research and Development Paris (France)
For primary bibliographic entry see Field 7D.
AD-658 781 HC$3.00 MF$0.65

RECENT ADVANCES IN AEROTHERMOCHEMISTRY, VOLUME II.
Advisory Group for Aerospace Research and Development Paris (France)
For primary bibliographic entry see Field 7D.
AD-658 782 HC$3.00 MF$0.65

DISSOCIATIVE IONIZATION OF H2 AND D2.
Joint Inst for Lab Astrophysics Boulder Colo
For primary bibliographic entry see Field 7D.
AD-658 804 Not available from CFSTI.

MERGED LAYER IONIZATION IN THE STAGNATION REGION OF A BLUNT BODY.
Aerospace Corp San Bernardino Calif San Bernardino Operations
For primary bibliographic entry see Field 20D.
AD-658 859 HC$3.00 MF$0.65

RF-INDUCED PLASMA SHIELD PROPAGATION IN RARE GASES,
General Electric Co Philadelphia Pa Missile and Space Div
G. W. Bethke, and A. D. Ruess. Aug 67, 87p
Rept no. Scientific-1
AFCRL-67-0491
Contract AF 19 (628)-4382

Descriptors: (*Plasma medium, *Electromagnetic shielding), Ionization, Propagation, Helium group gases, Microwaves, Radiofrequency power, Interactions, Electron density, Velocity, Pressure, Plasma physics.

It has been observed that microwave irradiation of localized weak ionization in heavy rare gases can cause an ionization wave to form and propagate towards the rf source. This ionization wave is preceded by an electron precursor, with the electron density at the ionization wave front increasing very rapidly to a maximum followed by a relatively slow plasma decay. At rf power levels well below normal breakdown, the ionization wave will form and then propagate at velocities from about 2,000 cm/second over 1,000,000 cm/second. Discontinuous changes of ionization wave velocities with changes in rf power and gas pressure indicate the existence of three different velocity-controlling mechanisms in the gas pressure and rf power ranges investigated. These mechanisms for ionization wave formation and propagation have been investigated in xenon, krypton, and argon gases, and are discussed. (Author)
AD-658 868 HC$3.00 MF$0.65

LABORATORY SIMULATION OF REENTRY PLASMA SHEATHS.
Rept. for May 66-Mar 67,
Aerospace Corp El Segundo Calif Labs Div
Gordon E. Stewart. Apr 67, 15p Rept no. TR-1001 (2220-10)-6
SSD-TR-67-144
Contract AF 04 (695)-1001

Descriptors: (*Plasma sheath, Simulation), (*Atmosphere entry, Plasma sheath), (*Glow discharges, Plasma generators), Communication systems, Antenna radiation patterns, Distortion, Electron density, Slot antennas, Wave transmission.

A technique was developed for simulating in the laboratory the electronic properties of reentry plasma sheaths using a novel type of discharge. This technique can be used to cover a metallic model of a reentry vehicle of almost any shape with a plasma layer. Unlike the conventional simulation methods using electrical discharges, glass walls are not needed to confine the discharge, and therefore pattern distortion is minimized. The plasma produced has an electron-density profile very similar to that found in the viscous boundary layer of a reentering vehicle. (Author)
AD-658 882 HC$3.00 MF$0.65

SHOCK-WAVE-GENERATED PLASMAS AS LIGHT SOURCES FOR OPTICAL PUMPING,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20E.
AD-658 935 Not available from CFSTI.

MEGAWATT LINE RADIATOR USING SEQUENTIAL INDUCTIVE DISCHARGES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20I.
AD-658 938 Not available from CFSTI.

MEGAWATT LINE RADIATOR USING SEQUENTIAL INDUCTIVE DISCHARGES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
A. Papayoanou, and R. G. Buser. 31 Jan 67, 2p
Availability: Published in IEEE Journal of Quantum Electronics p227-8 Jun 1967.

Descriptors: (*Lasers, *Pumping (Optical)), Plasma medium, Magnetic pinch, Spectra (Infrared), Spectra (Visible + ultraviolet), Ionization, Plasma physics, Gases.

Earlier investigations have established that high power line radiation results from fast discharges in medium pressure noble gases. Despite the high powers produced by these discharges, their practical usefulness for optical pumping has been limited by their small radiated energies. It was found that strong preionization allows coupling large energies into the gas and obtain radiated energies between 10 and 12 times higher than that produced by the primary discharge. In the system, radiated energies of 80 to 100 joules were obtained in the wavelength interval 2600 to 9000 A in times of the order of 40 microsec. At least 70 percent of this energy was concentrated in the interval 2600 to 5000 A. Consequently one has a fast, intense ultraviolet pump source which is well suited to the absorption bands (and characteristic transfer or fluorescent decay times) of certain laser materials, e.g., Y2O3:Eu (3+), CeF3:Nd (3+) and uranyl-sensitized barium crown glass with Nd (3+) doping. Furthermore, the fact that the radiation is predominantly due to line emission makes highly efficient reflective cavities possible in the coaxial tube geometry used.
AD-658 938 Not available from CFSTI.

MEASUREMENTS OF STARK PROFILES OF C II AND Ca II LINES,
National Bureau of Standards Washington D C
James R. Roberts, and K. L. Eckerle. 30 Jan 67, 4p
Availability: Published in Physical Review v159 n1 p104-7 Jul 5 1967.

Descriptors: (*Plasma medium, *Stark effect), (*Calcium, Line spectrum), (*Carbon, Line spectrum), Discharge tubes, Hydrogen, Helium, Carbon dioxide, Gas ionization, Impurities, Electron transitions.
Identifiers: Defender project.

An electromagnetic T tube was the source of a plasma used to measure line profiles of singly ionized atoms. The profiles of C II lines emitted by a plasma composed of He and CO2 in the ratio 95:5 were scanned with a monochromator. The profile scans were accomplished by repeated firings of the T tube while advancing the monochromator in wavelength steps. Also measured was the profile of the 3934 A Ca II resonance line emitted by a plasma composed of He, H2, and CO2 in the ratio 20:10:70 with Ca as an impurity. The profile of the 3889 A He I line was also measured and its halfwidth was used to determine the plasma electron density in the case of the C II lines. Likewise H-alpha was used to determine the electron density in the case of the Ca II line. The experimental C II and Ca II Stark-profile half-widths were compared with the theoretically calculated values. (Author)
AD-658 941 Not available from CFSTI.

PLASMA DENSITY CONTOUR MEASUREMENTS USING MOLECULAR ION BEAM BREAKUP,
Mobil Oil Corp Princeton N J Central Research Div Lab
F. C. Jobes, and R. L. Hickok. 13 Mar 67, 7p
AFOSR-67-2211

Contract F44620-67-C-0043
Availability: Published in The Review of Scientific Instruments v38 n7 p928-31 Jul 1967.

Descriptors: (*Plasma medium, Probes), (*Ion beams, Plasma physics), Density, Measurement, Particle beams, Dissociation, Interactions, Hydrogen.

Density contours of a magnetically confined plasma were determined by probing the plasma with an energetic molecular ion beam and measuring the atomic ions produced by collisional dissociation. The atomic ions are separated from the primary beam by the magnetic field. A 1.8 MeV H2 (+) beam was used to measure the density contours of a magnetically confined energetic arc with a spatial resolution in the plane of the measurement of 0.04 sq cm and a measurement time of 80 msec. (Author)
AD-659 020 Not available from CFSTI.

VOLUME ION PRODUCTION COSTS IN TENUOUS PLASMAS - A GENERAL ATOM THEORY AND DETAILED RESULTS FOR HELIUM, ARGON, AND CESIUM.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. V. Dugan, Jr., and R. J. Sovie. Sep 67, 50p
NASA-TN-D-4150
Contract 120-26-03-04-22

Descriptors: *Argon plasma, *Cesium plasma, *Helium plasma, *Ion production, Argon, Atom, Beam, Calculation, Case, Cesium, Coefficient, Cold, Collision, Cost, Cross section, Electron, Energy, Equation, Gas, Helium, Ion, Maxwell distribution, Model, Monoenergetic, Neutral, Plasma, Production, Rate, Theory, Volume.

For abstract, see STAR 05 21.
N67-35363 HC$3.00 MF$0.65

TURBULENT PROCESSES IN TOROIDAL SYSTEMS.
United Kingdom Atomic Energy Authority, Culham (England). Research Group.
B. B. Kadomtsev, and O. P. Pogutse. Mar 67, 193p
CLM-TRANS-11, IAE-1227
Transl. Into English of Report of the Kurchatov Inst. (Moscow), Iae-1227, Oct. 1966 P 1-176

Descriptors: *Plasma turbulence, *Toroidal plasma, *Transport coefficient, Coefficient, Column, Equation, Linear, Macroscopy, Motion, Plasma, Toroid, Transport, Turbulence.

For abstract, see STAR 05 21.
N67-35631 HC$3.00 MF$0.65

ON THE ONE-DIMENSIONAL MAGNETOHYDRODYNAMIC FLOW IN AN ANNULUS.
Pennsylvania Univ., Philadelphia. Inst. for Direct Energy Conversion.
I. M. Cohen, and S. Schweitzer. Aug 67, 16p
NASA-CR-88198, INDEC-53
Grant NSG-316

Descriptors: *Annulus, *Magnetohydrodynamic flow, *One-dimensional flow, Boundary, Condition, Dimensional, Equation, Equilibrium, Flow, Hydrostatic, Inviscid, Liquid, Lorentz force, Magnetohydrodynamic, Maxwell equation, Metal, Momentum, One.

For abstract, see STAR 05 21.
N67-35863 HC$3.00 MF$0.65

EFFECT OF GYRO-VISCOSITY ON RAYLEIGH-TAYLOR INSTABILITY OF A PLASMA.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
N. K. Nayyar, and S. K. Trehan. Aug 67, 20p
NASA-TM-X-55906, X-640-67-384

Descriptors: *Plasma instability, *Tensor analysis, Analysis, Calculus, Effect, Gyro, Gyroscope, Instability, Ion, Ionization, Oscillation, Plasma, Stability, Tensor, Vector, Viscosity.

For abstract, see STAR 05 21.
N67-35875 HC$3.00 MF$0.65

THE CONSTRUCTION AND GENERAL PROPERTIES OF A BRUSH CATHODE DISCHARGE.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
J. P. Bingham. Aug 67, 57p NASA-CR-88266, TR-719
Contract NGR-21-002-060

Descriptors: *Cathode, *Discharge tube, *Glow discharge, *Langmuir probe, Brush, Construction, Current, Density, Direct, Discharge, Electron, Glow, Measurement, Negative, Plasma, Temperature, Tube.

For abstract, see STAR 05 21.
N67-35893 HC$3.00 MF$0.65

KINETIC EQUATION FOR A PLASMA AND ITS APPLICATION TO HIGH-FREQUENCY CONDUCTIVITY.
Michigan Univ., Ann Arbor. Dept. of Aerospace Engineering.
J. H. Fu, R. L. Guernsey, and R. S. Ong. Apr 67, 103p NASA-CR-88132
Grant NSG-220-62, Contract AF-AFOSR-825-65

Descriptors: *High frequency, *Kinetic equation, *Plasma conductivity, Conductivity, Correlation, Distribution, Equation, Frequency, Function, High, Inhomogeneity, Kinetic, Nonisotropic, Pair, Plasma.

For abstract, see STAR 05 21.
N67-36030 HC$3.00 MF$0.65

LANDAU DAMPING IN A RELATIVISTIC PLASMA.
Miami Univ., Coral Gables, Fla. Center for Theoretical Studies.
B. Kursunoglu. May 67, 11p NASA-CR-88269
Contract NGR-10-007-010

Descriptors: *Landau damping, *Plasma wave, *Relativistic plasma, Absorption, Analysis, Cooling, Energy, Longitudinal, Numerical, Plasma, Relativity, Transverse, Wave.

For abstract, see STAR 05 21.
N67-36035 HC$3.00 MF$0.65

COMPUTER EXPERIMENTS ON LOW DENSITY CROSSED- FIELD ELECTRON BEAMS.
Avco-everett Research Lab., Everett, Mass.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 21.
N67-36036 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE HIGH TEMPERATURE CHEMISTRY AND PHYSICS OF GASES AND PLASMAS.
International Union of Pure and Applied Physics, London (England). Commission on High Temperatures and Refractories.
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 21.
N67-36450 HC$3.00 MF$0.65

SOUND WAVES IN PLASMAS A BASIC PHENOMENON AND A SIMPLE DIAGNOSTIC TOOL,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18A.
For abstract, see NSA 21 19.
ORNL-4089 HC$3.00 MF$0.65

20J. Quantum Theory

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 9B.
AD-658 439 HC$3.00 MF$0.65

CLASSICAL AND QUANTAL CALCULATIONS ON ELECTRON CAPTURE.
Physical sciences research paper no. 328,
Air Force Cambridge Research Labs L G Hanscom Field Mass
Robert A. Mapleton. Jun 67, 324p Rept no. AFCRL-67-0351
Doctoral thesis.

Descriptors: (*Electron capture, Probability), (*Atomic orbitals, Electron capture), Scattering, Ions, Protons, Interactions, Quantum statistics, Field theory, Green's function, Mathematical models, Wave functions, Approximation (Mathematics), Hydrogen, Oxygen, Nitrogen, Helium group gases, Alkali metals.

Classical and quantal nonrelativistic scattering between simple atomic systems is reviewed, and most approximations currently used in calculations on electron capture are discussed. The OBK interaction is generalized to include capture from neutral atoms by singly charged many-electron ions; the sum over the squares of the vector coupling coefficients is affected in the formula for the OBK cross section for p-orbital capture by protons into H (ns). The cross section for H (+) + H (1s) to H (Sigma n1) + H (+) at high impact energies is determined classically. The second Born amplitudes at high impact energies for H (+) + H (1s) to H (1s) + H (+) and H (+) + D (1s) to H (1s) + D (+) are evaluated approximately using the Green's function of the post Hamiltonian. Two modifications of Thomas' classical model for heavy atoms are proposed, and corresponding cross sections are calculated for H (+) + B to H (Sigma n1) + B (+) with B = O, N, Ne, A, Kr, Xe. A semiclassical theory is developed for charge transfer in alkali atom-alkali-ion collision at low impact velocities, and cross sections are obtained for H, Li, Na, K, Rb, Cs. OBK cross sections are calculated for s-orbital capture from He (1s (2)), N ((4)S), O ((3)P), and p-orbital capture from N ((4)S), O ((3)P), all for incident protons capturing into H (1s). Born prior and post cross sections are calculated for H (+) + O ((3)P) to H (1s) + O (+) ((4)S) and H (1s) + H (1s) to H (-) (1s (2)) + H (+).
AD-658 445 HC$3.00 MF$0.65

A NUMERICAL SINGLE-CENTER SELF-CONSISTENT FIELD FUNCTION FOR THE HYDROGEN MOLECULE.
Aerospace Corp El Segundo Calif Labs Div
Roger L. Wilkins, and Howard S. Taylor. Jun 67, 43p Rept no. TR-1001 (2240-20)-15
SSD-TR-67-133
Contract AF 04 (695)-1001
Prepared in cooperation with University of Southern California, Los Angeles.

Descriptors: (*Hydrogen, *Wave functions), Field theory, Hartree-Fock approximation, Molecular orbitals, Numerical analysis, Integral equations, Partial differential equations.

A Hartree-Fock single determinant wave function is calculated for the normal state (1)Sigma (+)g of the hydrogen molecule. The one-electron molecular orbitals in this determinant are expanded up to fourth-order terms as a product of a series of spherical harmonics and radial wave functions about the molecular midpoint of the molecule. The

potential field caused by the nuclei is expanded in spherical harmonics up to eighth-order terms, and the complete Hartree-Fock equations are set up and solved numerically for the three radial functions occurring in one-electron molecular orbitals. The numerical technique used to solve the three coupled second-order differential-integral equations differs from that usually used in atomic calculations. The total molecular energy obtained from this numerical approximation is -1.14100 a. u., which is a small improvement over the total analytic self-consistent energy of -1.13363 a. u. obtained by Kolos and Roothaan using nine-term orbitals. This calculation shows that the best Hartree-Fock Roothaan self-consistent field (SCF) molecular wave function must be very close indeed to the true Hartree-Fock SCF molecular wave function. (Author)
AD-658 447 HC$3.00 MF$0.65

TWO AND THREE PARTICLE COULOMB SYSTEMS,
Pittsburgh Univ Pa Space Research Coordination Center
Gerald L. Nutt. 11 Aug 67, 28p Rept no. SRCC-53
Contracts Nonr-624 (16), NsG-416

Descriptors: (*Potential scattering, Matrix algebra), Elementary particles, Interactions, Hilbert space, Momentum, Integrals.
Identifiers: T-matrix, Unitary.

The Coulomb T-matrix is examined in a two body and a three body Hilbert space. The purpose is to demonstrate how this function may be used to construct the Faddeev three body kernel. In the process the apparent paradox of the indefiniteness of the Coulomb T-matrix on the energy shell is resolved. The question of off shell unitarity is discussed. (Author)
AD-658 540 HC$3.00 MF$0.65

HIGH-TEMPERATURE EXPANSIONS FOR THE CLASSICAL HEISENBERG MODEL. I. SPIN CORRELATION FUNCTION.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20C.
AD-658 762 Not available from CFSTI.

REDUCTION OF REDUCIBLE REPRESENTATIONS OF THE INFINITESIMAL GENERATORS OF THE PROPER, ORTHOCHRONOUS, INHOMOGENEOUS LORENTZ GROUP,
Massachusetts Inst of Tech Lexington Lincoln Lab
J. S. Lomont, and H. E. Moses. 2 Sep 66, 15p
Rept no. JA-2871
ESD-TR-67-472
Contract AF 19 (628)-5167, ARPA Order-512
Prepared in cooperation with Arizona Univ., Tucson.
Availability: Published in Journal of Mathematical Physics v8 n4 p837-49 Apr 1967.

Descriptors: (*Groups (Mathematics), Quantum mechanics), Wave functions, Momentum, Hilbert space, Operators (Mathematics), Matrix algebra, Theorems, Relativity theory.
Identifiers: Eigenvalues.

The paper shows how to reduce reducible representations of the infinitesimal generators of the proper, orthochronous, inhomogeneous Lorentz group. We first construct a basis in which all the reducible representations are expressed as integrals of representations over masses and in which the infinitesimal generators act as in the Foldy-Shirokov realization for nonzero masses and in the Lomont-Moses realization for zero masses. However, the spin operators which appear in the Foldy-Shirokov realizations and the generators of the Euclidean group which appear in the Lomont-Moses realizations are reducible in general. Thus reducible representations are only partially reduced in this basis. On carrying out the reduction of the spin operators and the generators of the Euclidean group, we introduce a second basis such that the reducible representations are completely reduced. By changing the emphasis slightly, the methods of the present paper can be used to obtain the irreducible representations of the generators. One of us (H. E. M.) has already used the methods of the present paper to reduce the electromagnetic vector potential and, in papers which follow the present one, will show how to reduce wavefunctions in general and will also derive the Clebsch-Gordan expansion for the direct product of two massless representations of finite spin and the same sign of energy. From the work of Mautner and Mackey it is known that every reducible unitary ray representation of the proper, orthochronous, inhomogeneous Lorentz group can be reduced to a direct integral of the irreducible representations. The techniques of the present paper thus enable us to carry out the reduction explicitly.
AD-658 764 Not available from CFSTI.

HIGH-TEMPERATURE EXPANSIONS FOR THE CLASSICAL HEISENBERG MODEL. II. ZERO-FIELD SUSCEPTIBILITY.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20C.
AD-658 766 Not available from CFSTI.

CORRELATION THEORY OF QUANTIZED ELECTROMAGNETIC FIELDS. I. DYNAMICAL EQUATIONS AND CONSERVATION LAWS,
Rochester Univ N Y Dept of Physics and Astronomy
C. L. Mehta, and E. Wolf. 27 Oct 66, 7p
AROD-4965:20
Grant DA-ARO (D)-31-124-G918
Availability: Published in The Physical Review v157 n5 p1133-7 May 25 1967.

Descriptors: (*Coherent radiation, *Field theory), Electromagnetic waves, Tensor analysis, Quantum mechanics, Invariance, Partial differential equations.

Dynamical equations are derived, which describe the space-time development of second-order coherence tensors of a quantized electromagnetic field in vacuo. With the help of these equations, laws for the conservation of correlations are obtained. Some new non-negative-definiteness conditions which the coherence tensors obey are also established. (Author)
AD-658 791 Not available from CFSTI.

USE OF LINEAR NONSYMMETRIC EIGENVALUE EQUATIONS FOR A SUM-OVER-POINTS APPROACH: APPLICATION TO H2+,
Boeing Scientific Research Labs Seattle Wash
Charles M. Carlson. Sep 67, 18p Rept no. D1-82-0644

Descriptors: (*Matrix algebra, Equations), (*Wave functions, Matrix algebra), (*Hydrogen, Wave functions), Vector spaces, Functions, Optimization, Quantum mechanics, Ions.
Identifiers: Eigenvalues, Schrodinger equation.

Linear eigenvalue equations Summation, j=1 to j=n sub c of (c sub j (H sub ij - epsilon S sub ij)) = 0 in which the matrix components, H sub ij and S sub ij, as in the local energy method of Frost and coworkers, are sums over sets of points are proposed for computing approximate ground state eigenvalues epsilon and eigenvectors c sub j for the linear trial wave function phi = Summation, j=1 to j=n sub c of (c sub j phi superscript j). Results paralleling those obtained by Frost, Kellogg and Curtis were achieved using these equations for calculations on H2+ employing the same sets of points and basis functions.
AD-658 793 HC$3.00 MF$0.65

HARTREE-FOCK THEORY: SLATER DETERMINANTS OF MINIMUM ENERGY.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 7D.
AD-658 907 Not available from CFSTI.

QUANTUM KINETIC EQUATIONS FOR ELECTRONS IN RANDOM IMPURITIES,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20L.
AD-658 909 Not available from CFSTI.

ASTRONOMICAL CONSTANTS AND PLANETARY EPHEMERIDES DEDUCED FROM RADAR AND OPTICAL OBSERVATIONS.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 3A.
AD-658 914 Not available from CFSTI.

CORRELATION THEORY OF QUANTIZED ELECTROMAGNETIC FIELDS. II. STATIONARY FIELDS AND THEIR SPECTRAL PROPERTIES,
Rochester Univ N Y Dept of Physics and Astronomy
C. L. Mehta, and E. Wolf. 27 Oct 66, 15p
AROD-4965:21
Grant DA-ARO (D)-31-124-G569
AD-658 791.
Availability: Published in Physical Review v157 n5 p1188-97 May 25 1967.

Descriptors: (*Electromagnetic fields, *Quantum mechanics), (*Coherent radiation, Quantum mechanics), Tensor analysis, Invariance, Field theory, Energy, Momentum, Statistical distributions.

In Paper I (AD-658 931), dynamical laws which describe the space-time development of second-order coherence tensors of a quantized electromagnetic field in vacuo, and the associated conservation laws, were derived. In the first part of the present paper these results are specialized to stationary fields. Second-order cross-spectral tensors for such fields are then introduced, and some of their properties are discussed. A relation analogous to the Wiener-Khintchine theorem of the theory of stationary random processes is derived. Various non-negative-definiteness conditions obeyed by the cross-spectral tensors are established, and equations which govern the spatial variation of these tensors are deduced. Certain analytic properties of the correlation tensors are derived, and some of their consequences are examined. It is also shown that in the limiting case when the two space-time arguments of the coherence tensors coincide, two of our conservation laws reduce to the averaged form of the energy and the momentum conservation laws of the electromagnetic field. (Author)
AD-658 931 Not available from CFSTI.

QUANTUM OPTICS. I. EXCITATION OF A DAMPED RADIATION MODE BY WEAKLY COUPLED SOURCES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20F.
AD-658 937 Not available from CFSTI.

STUDY OF SPECTRAL REPRESENTATIONS FOR SIMPLE QUANTUM-MECHANICAL SYSTEMS.
Revised ed.,
Boston Univ Mass Dept of Physics
W. S. Hellman, and P. Roman. 16 Feb 67, 13p
AFOSR-67-2196
Grant AF-AFOSR-385-65

Revision of manuscript submitted 12 Dec 66.
Availability: Published in American Journal of Physics v35 n7 p614-24 Jul 1967.

Descriptors: (*Quantum mechanics, Functions), Statistical distributions, Green's function, Parity, Operators (Mathematics), Ground state.

Spectral representations for two-point functions of point quantum-mechanical systems are derived, under very general assumptions. Sum rules are then obtained, both for systems with velocity independent and dependent interactions. The implications of these sum rules are illuminated on particularized simple systems. Special attention is paid to systems where a zero-frequency (translational) mode exists. The difference between velocity-dependent and -independent interactions is shown to be very crucial in this respect. The same analysis provides an instructive example of inadvertent misuse of the spectral representations. Finally, the possibility of Goldstone behavior, with all its consequences and implications, is demonstrated for systems with finite many degrees of freedom. (Author)
AD-658 960 Not available from CFSTI.

TOWERS AS SETS OF COMPOSITE PARTICLES AND TROUBLE WITH INFINITE-COMPONENT FIELD THEORIES,
Institute for Advanced Study Princeton N J
M. B. Halpern. 20 Mar 67, 5p
AFOSR-67-2209
Grant AF-AFOSR-42-65
Availability: Published in Physical Review v159 n5 p1328-30 Jul 25 1967.

Descriptors: (*Elementary particles, Interactions), (*Field theory, Accuracy), Perturbation theory, Regge poles, Particle trajectories, Nuclear spins, Operators (Mathematics), Quantum mechanics.
Identifiers: Towers (Quantum mechanics), Unitarity.

It is argued, perturbation theory, that if an infinite number of particles with mass and spin going to infinity (tower) is to be consistent with unitarity in the cross channel then, in general, all the particles in the tower (except perhaps the lowest) must be composite; that is, as the coupling is turned off, most or all of the tower must disappear. Because of this, definite trouble with unitarity is indicated for infinite-component field theories with towers in the free Lagrangian. (Author)
AD-658 965 Not available from CFSTI.

THE n-n SCATTERING LENGTH, THE THREE-BODY PROBLEM AND CHARGE SYMMETRY,
New South Wales Univ Kensington (Australia) Dept of Applied Mathematics
For primary bibliographic entry see Field 20H.
AD-659 011 Not available from CFSTI.

20K. Solid Mechanics

THE DYNAMIC ELASTIC-PLASTIC INTERFACE AND RELATED TOPICS.
Technical rept.,
Kentucky Univ Lexington Dept of Engineering Mechanics
Oscar W. Dillon, Jr. Jun 67, 42p Rept no. TR-1
AFOSR-67-1440
Contract AF 49 (638)-1646

Descriptors: (*Pipes, Shock waves), Interfaces, Deformation, Aluminum, Strain (Mechanics), Stresses, Impact shock.

Experimental data for the response in a bar when a plastic deformation wave impinges upon a junction with an elastic material are presented. This is accomplished by using a composite aluminum specimen made by gluing a short annealed (soft) section to a long hard (elastic) one. The short section is ten inches long and therefore strain histories at several points are easily observed by means of wire resistance strain gauges. It is found that there are reflections from the elastic-plastic interface which are in qualitative agreement with the predictions of the strain-rate independent theory. However, the experimental data do differ from this theory in quantitative ways. This discrepancy is due in part to interactions with the material in the response range where it is strain-rate dependent. (Author)
AD-658 487 HC$3.00 MF$0.65

LIMIT ANALYSIS AND YIELD LINE THEORY,
Illinois Inst of Tech Chicago Dept of Mechanics
Antoni Sawczuk, and Philip G. Hodge, Jr. Aug 67, 37p Rept no. DOMIIT-1-35
Contract Nonr-1406 (04)

Descriptors: (*Loading (Mechanics), Theory), Moments, Panels (Structural), Analysis, Structural properties.

The relationship between limit analysis and yield-line analysis is investigated. Attention is restricted to simply-supported, isotropic slabs subjected to single point loadings. It is found that conventional yield-line analyses quite often give substantial over-estimates of the carrying capacity. A general method is formulated for finding the yield-point load, and various examples are considered. (Author)
AD-658 503 HC$3.00 MF$0.65

SHAKEDOWN INTERACTION CURVE FOR A CIRCULAR ARCH,
Illinois Inst of Tech Chicago Dept of Mechanics
Philip G. Hodge, Jr., and A. J. Kalinowski. Aug 67, 34p Rept no. DOMIIT-1-36
Contract Nonr-1406 (04)

Descriptors: (*Convex bodies, Loading (Mechanics)), Deformation, Plasticity, Beams (Structural), Sandwich construction, Structural properties, Graphics, Interactions.

A shakedown interaction curve is obtained for a simply supported sandwich arch subject to a central concentrated load and a symmetrically applied edge couple where both loads are allowed to vary arbitrarily between independently prescribed limits. The solution is obtained exactly from below and is used as a reference solution against which an upper bound technique is investigated. (Author)
AD-658 504 HC$3.00 MF$0.65

ELEMENT STIFFNESS-MATRICES FOR BOUNDARY COMPATIBILITY AND FOR PRESCRIBED BOUNDARY STRESSES.
Massachusetts Inst of Tech Cambridge
For primary bibliographic entry see Field 13M.
AD-658 512 Not available from CFSTI.

ASYMPTOTIC SOLUTION FOR SHORT RING-REINFORCED OVAL CYLINDERS,
Polytechnic Inst of Brooklyn N Y Dept of Aerospace Engineering and Applied Mechanics
Neil B. Nissel, and William P. Vafakos. Aug 67, 47p
PIBAL-928
Contract Nonr-839 (39)

Descriptors: (*Asymptotic series, Cylindrical bodies), (*Stresses, Cylindrical bodies), Differential equations, Stresses, Deflection, Theory, Deformation, Hydrostatics, Rings, Rotation, Fourier analysis, Series.

An asymptotic expansion procedure is applied to the analysis of a typical bay in a hydrostatically loaded, ring-reinforced, non-circular cylinder. The existence of two distinct characteristic lengths is used in the construction of two asymptotic series which, when combined, form the total solution. The procedure is similar to that proposed by E. Reissner for circular cylinders. The leading terms in the expansions for all stress resultants and deflections are obtained explicitly, and numerical results are compared to available theoretical and experimental data. (Author)
AD-658 516 HC$3.00 MF$0.65

THE ACTION OF A VIBRATION LOAD ON POLYMER MATERIALS.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 11I.
AD-658 603 HC$3.00 MF$0.65

A STEADY-STATE FORMULATION FOR THE TRANSIENT RESPONSE OF A REINFORCED CYLINDRICAL SHELL IMMERSED IN A FLUID MEDIUM,
Polytechnic Inst of Brooklyn N Y Dept of Aerospace Engineering and Applied Mechanics
For primary bibliographic entry see Field 13M.
AD-658 621 Not available from CFSTI.

ON INEXTENSIONAL VIBRATIONS OF THIN SHELLS.
Technical rept.,
Army Natick Labs Mass Office of the Scientific Director
Edward W. Ross, Jr. Jul 67, 34p
USA-NLABS-TR-68-14-OSD

Descriptors: (*Bodies of revolution, *Vibration), Elasticity, Approximation (Mathematics), Boundary value problems, Spheres, Tents, Parachutes, Containers, Mathematical analysis.
Identifiers: Thin spherical shells.

In this paper, the non-symmetric, free, elastic vibrations of thin domes of revolution are studied. It is assumed that the frequency is low. The asymptotic approximations previously given by the writer are used to estimate the general solution to the shell vibration equations at low frequencies. Approximations for the low natural frequencies and modes are derived systematically under a variety of edge conditions. Low natural frequencies are found only when the edge conditions impose no forces tangent to the shell surface. When the edge is free (and only then) Rayleigh's inextensional frequencies are recovered. For certain other edge conditions new natural frequencies are found that are above Rayleigh's frequencies but still low compared, e.g., with the lowest membrane frequency. The displacement modes associated with these new frequencies are mostly of inextensional type. The general results are applied to estimate these new frequencies for spherical domes. (Author)
AD-658 672 HC$3.00 MF$0.65

CIRCULAR RING REDUNDANTS.
Picatinny Arsenal Dover N J Data Processing Systems Office
For primary bibliographic entry see Field 13M.
AD-658 683 HC$3.00 MF$0.65

ANALYSIS OF MECHANICAL TESTING PROCEDURE FOR BRITTLE MATERIALS.
Interim rept. Mar 66-Mar 67,
IIT Research Inst Chicago Ill
S. A. Bortz, and T. B. Wade. Sep 67, 204p
AMRA-CR-67-09/1
Contract DA-19-066-AMC-321 (X)

Descriptors: (*Brittleness, Test methods), Ceramic materials, Refractory materials, Compressive properties, Tensile properties, Mechanical properties, Elasticity, Fracture (Mechanics), Rupture.

The purpose of the research is to provide a guide for investigators in the performance of mechanical

tests and the interpretation of test results. A review of the philosophy of testing and the problem areas in studying brittle materials is provided. Research effort consists of investigating mechanical test procedures and analyzing property data with regard to these test procedures, so that the best practice can be determined. Evaluated information is organized into three sections: (1) Test philosophy, test techniques and analytical methods. (2) Correlation of laboratory tests and recommended procedures. (3) Tabular presentation of test data. (Author)
AD-658 695 HC$3.00 MF$0.65

THREE-DIMENSIONAL ELASTICITY THEORY FOR FLAT-PLATE MEMORY ELEMENTS SUBJECTED TO SPACE-VARIABLE NORMAL TRACTION.
Columbia Univ New York Dept of Mechanical Engineering
For primary bibliographic entry see Field 9B.
AD-658 727 HC$3.00 MF$0.65

BUCKLING OF A CIRCULAR PLATE UNDER AN UNUSUAL COMBINED LOAD.
Revised ed.,
New York Univ N Y Courant Inst of Mathematical Sciences
Herbert B. Keller. 12 Apr 66, 20p
AROD-5574:2
Contract DA-31-124-ARO (D)-360
Revision of manuscript submitted 23 Jan 65.
Availability: Published in SIAM J. Appl. Math. v14 n6 p1275-92 Nov 1966.

Descriptors: (*Buckling (Mechanics), Metal plates), Elasticity, Force (Mechanics), Stresses, Bending, Compressive properties, Loading (Mechanics), Boundary value problems, Deformation, Initial value problems, Theorems.

The report considers a thin circular elastic plate which is subjected to a combined load consisting of a constant thrust, f, applied to its edge and to a uniform normal force, P, applied to one of its faces. However this pressure load is proportional to the magnitude of the curvature or of the bending stress at the center of the plate. One possible equilibrium state for this plate is that of uniform compression or extension in which it contracts or expands radially and remains plane--in this case P = 0. When the edge thrust is compressive and sufficiently large it is expected that this state of uniform contraction is unstable and that other states occur. We call these buckled states in which the plate is deformed out of its plane and for which possibly P not equal to 0. This paper investigates the existence and properties of rotationally symmetric buckled states and determine the critical edge thrusts at which buckling occurs for both linear and nonlinear theories. The nonlinear von Karman equations of plate theory is used and the analysis is essentially the Poincare bifurcation theory applied to a boundary value problem.
AD-658 803 Not available from CFSTI.

ON THE THEORETICAL RELATIONSHIP BETWEEN FLOW STRESS AND LARGE NATURAL STRAINS IN TENSILE TESTS ON STEEL CYLINDERS,
Indiana Univ Bloomington
T. Y. Thomas. 1967, 11p
AROD-7211:1
Grant DA-ARO (D)-31-125-G928
Availability: Published in Proceedings of the National Academy of Sciences v58 n1 p11-8 Jul 1967.

Descriptors: (*Cylindrical bodies, Stresses), (*Steel, Cylindrical bodies), Strain (Mechanics), Creep, Fracture (Mechanics), Force (Mechanics), Tensile properties, Tests, Hydrostatic pressure.

In his work on large plastic flow and fracture, Bridgman was led to a set of equations for the principal stresses in the minimum section of neck of a circular steel cylinder subjected to a tensile force in the direction of its axis and an imposed hydrostatic pressure. These equations express the stress field over the minimum section of the neck to a high degree of approximation. The paper is concerned with the theoretical relationship between the flow stress and the natural strain defined as the logarithm of the ratio A sub O/A where A sub O and A are the areas of the initial cross section of the cylinder and the minimum section of the neck, respectively. The basic flow equations are constructed, the derivation of the theoretical relationship between flow stress and natural strain is given, and a comparison is made between theory and experiment. (Author)
AD-658 807 Not available from CFSTI.

BUCKLING OF UNSTIFFENED CONICAL SHELLS UNDER COMBINED LOADING,
Technion - Israel Inst of Tech Haifa
A. Berkovits, J. Singer, and T. Weller. 1967, 52p
Rept no. Paper-1241
Grant AF-EOAR-58-63
Presented at 1967 Sesa Spring Meeting, Ottawa, Ontario, Canada, May 16-19.

Descriptors: (*Buckling (Mechanics), *Structural shells), (*Loading (Mechanics), Structural shells), Aluminum alloys, Compressive properties, Torsion, Stability, Interactions.

An experimental program was conducted in order to determine the family of interaction curves for the buckling of unstiffened conical shells under combined axial compression, torsion, and external or internal pressure. Careful experimental technique permitted many repeated buckling tests on the same aluminum-alloy shell without noticeable damage and yielded reliable interaction curves. Results of combined loading tests are presented and compared with linear theory. Test results show that the interaction curve for compression-torsion-pressure loading is defined by superposition of compression-pressure, torsion-pressure and compression-torsion behavior. (Author)
AD-658 815 HC$3.00 MF$0.65

CREEP STRESS CONCENTRATION OF A CIRCULAR HOLE IN AN INFINITE PLATE,
Polytechnic Inst of Brooklyn N Y Dept of Aerospace Engineering and Applied Mechanics
Sharad A. Patel, Michael R. Birnbaum, and B. Venkatraman. Jul 67, 56p
AFOSR-67-1399, PIBAL-930
Contract AF 49 (628)-1360

Descriptors: (*Creep, Stresses), (*Stresses, Boundary value problems), Tensile properties, Compressive properties, Loading (Mechanics), Elasticity, Flow charting, Computer programs, Mathematical analysis.

The present report is concerned with the creep problem of stress concentration at holes in thin sheets subjected to loads in their own plane. In particular, the problem of creep stress concentration at a small circular hole in an infinite thin plate subjected to uniaxial tension is analyzed in the first part of the report. The second part is essentially an extension of the preceding analysis to the case when the loading is biaxial and consists of tension and compression. These analyses are based on a creep power law and an analogy between the problem of creep and the corresponding nonlinear elastic problem. The solution of this problem is based on Galerkin's method. The stress solutions for some values of the index of the power law are presented. (Author)
AD-658 833 HC$3.00 MF$0.65

THE EFFECT OF INTERMEDIATE CONDITIONING IN THE PROCESS OF STEEL FATIGUE ON STEEL DURABILITY,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 11F.
AD-658 879 HC$3.00 MF$0.65

PRESSURE STABILITY OF PROLATE SPHEROIDS.
Allied Research Associates, Inc., Concord, Mass.
H. Becker. 4 Nov 66, 12p NASA-CR-87985, ARA-327-3
Contract NASW-1378

Descriptors: *Donnell equation, *Elastic stability, *Numerical analysis, *Prolate spheroid function, *Shell stability, Analysis, Axisymmetry, Buckling, Coefficient, Cylinder, Effect, Elastic, Equation, External, Function, Isotropic, Metal, Numerical, Pressure, Pressurization, Prolate, Shell, Slender, Sphere, Spheroid, Stability, Stiffness, Stress, Susceptibility, Theory.

For abstract, see STAR 05 21.
N67-35447 HC$3.00 MF$0.65

FATIGUE LIFE UNDER RANDOM LOADING FOR SEVERAL POWER SPECTRAL SHAPES.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 21.
N67-35726 HC$3.00 MF$0.65

METEOROID DAMAGE TO FILAMENTARY STRUCTURES.
Astro Research Corp., Santa Barbara, Calif.
For primary bibliographic entry see Field 3B.
For abstract, see STAR 05 21.
N67-35736 HC$3.00 MF$0.65

PLANE-STRESS ANALYSIS OF AN EDGE-STIFFENED RECTANGULAR PLATE SUBJECTED TO BOUNDARY LOADS, BOUNDARY DISPLACEMENTS, AND TEMPERATURE GRADIENTS.
Syracuse Univ. Research Inst., N. Y.
C. Libove, and C.-J. Lin. Aug 67, 234p NASA-CR-864, ME-1065-6704
Grant NSG-385

Descriptors: *Displacement, *Edge loading, *Rectangular plate, *Stress analysis, *Temperature gradient, Analysis, Boundary, Edge, Fourier series, Gradient, Loading, Plane, Plate, Rectangle, Stiffener, Strain, Stress, Temperature, Thermal.

For abstract, see STAR 05 21.
N67-35744 HC$3.00 MF$0.65

STRUCTURAL RESPONSE TO INFLIGHT ACOUSTIC AND AERODYNAMIC ENVIRONMENTS.
Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
K. L. Chandiramani, P. A. Franken, R. H. Lyon, and S. E. Widnall. 31 Jul 67, 138p NASA-CR-88211, REPT.-1417
Contract NAS8-20026

Descriptors: *Acoustic vibration, *Aerodynamic noise, *Structural vibration, Acoustic, Aerodynamic, Environment, Estimate, Fluctuation, Inflight, Interaction, Mathematics, Model, Noise, Radiation, Response, Statistical, Structural, Surface, Vibration.

For abstract, see STAR 05 21.
N67-36060 HC$3.00 MF$0.65

BASIC TYPES OF DEFORMATION MICRO-CONTOURS APPEARING ON THE SURFACE OF COMMERCIAL IRON TEST-PIECES DURING FATIGUE TESTING UNDER HEATING IN VACUO.

United Kingdom Atomic Energy Authority, Harwell (England). Information Branch.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 21.
N67-36191 HC$3.00 MF$0.65

THE EFFECT OF REPEATED STRESSING ON THE BEHAVIOR OF LITHIUM FLUORIDE CRYSTALS.
Technical rept.,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
Arthur J. McEvily, Jr., and E. S. Machlin. 1961, 21p NASA-TR-R-91
AD-250-019, N62-70515
Prepared in cooperation with Columbia Univ., New York.

Descriptors: (*Lithium fluorides, Stresses), (*Single crystals, *Fatigue (Mechanics)), Crystal lattice defects, Dislocations, Failure (Mechanics), Loading (Mechanics), Etched crystals.

Results of reversed-bend tests on LiF single crystals at 2 cpm are similar to those previously obtained at 1,800 CMP, indicating that speed effects are relatively unimportant. Reversed-torsion tests yield additional evidence that vacancy formation is not a primary cause of fatigue failure. Since LiF does not readily cross slip, the absence of fatigue failures lends further support to the theory that cross slip is necessary in order to obtain usual fatigue behavior. The results demonstrate that dislocation pileups do not lead to failure in LiF, and that plastic deformation in the course of reversed cycling will relax an initially applied mean load. Etch-pit studies yield visual evidence of the growth of slipbands during cycling. (Author)
PB-175 898 HC$3.00 MF$0.65

PREDICTION OF CREEP IN STRUCTURAL CONCRETE.
Final rept.,
Illinois Univ., Urbana. Dept. of Theoretical and Applied Mechanics.
Edward M. Wallo, and Clyde E. Kesler. Dec 66, 118p Rept. no. T/AM-670
Prepared in cooperation with Illinois State Div. of Highways, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, *Construction materials), (*Creep, Predictions), Environment, Shrinkage, Loading (Mechanics), Moisture, Viscosity, Stresses, Stability.

The general objective of this report was to present a procedure to predict the creep that will occur in structural concrete under various environmental conditions. Also, to present information on the viscous nature of concrete, the mechanism of creep, and a theoretical model representing this behavior. Changes in the composition or environment of the concrete will effect its volume stability. Some of the factors which influence its volume stability are: Mix constituents and proportions, mixing time and consolidation, age at loading, moisture content, stresses, ambient air condition, size of specimen, strength and reinforcement. Creep of concrete is divisible into two components referred to as basic creep and drying creep. Basic creep is that part of creep which occurs independently of the loaded specimen's moisture gain or loss. Drying or wetting creep is creep which results from simultaneous moisture loss or gain of the loaded specimen. Involved and complicated formulas for predicting both basic and drying creep are given.
PB-176 026 HC$3.00 MF$0.65

INFLUENCE OF BEAM SIZE ON THE SHEARING FRACTURE OF MORTAR AND CONCRETE BEAMS.
Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
For primary bibliographic entry see Field 13M.
PB-176 072 HC$3.00 MF$0.65

FLEXURAL FATIGUE DURABILITY OF SELECTED UNREINFORCED STRUCTURAL LIGHTWEIGHT CONCRETES.
Texas Transportation Inst., College Station.
For primary bibliographic entry see Field 11B.
PB-176 104 HC$3.00 MF$0.65

STATIC BEHAVIOR OF CONTINUOUS COMPOSITE BEAMS,
Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.
For primary bibliographic entry see Field 13M.
PB-176 106 HC$3.00 MF$0.65

STATIC BEHAVIOR OF COMPOSITE BEAMS WITH VARIABLE LOAD POSITION,
Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.
For primary bibliographic entry see Field 13M.
PB-176 108 HC$3.00 MF$0.65

20L. Solid-State Physics

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 9B.
AD-658 439 HC$3.00 MF$0.65

HOT ELECTRON POLAR SCATTERING IN InSb.
Royal Inst of Tech Stockholm (Sweden) Microwave Dept
C. Hammar, and P. Weissglas. 13 Jul 67, 11p
Rept no. Scientific-20
RADC-TR-67-507
Contract AF 61 (052)-895

Descriptors: (*Semiconductors, *Lead), (*Indium, Semiconductors), Electrons, Photons, Energy, Scattering, Momentum, Partial differential equations.

The energy and momentum relaxation of conduction electrons by optical phonons in InSb is studied. The energy band structure calculated by Kane is used. For simplicity, the drifted Maxwellian approach is used and its form for an arbitrary band structure presented. No intrinsic breakdown is obtained. On the contrary, the model gives a voltage-controlled differential negative mobility for high fields. (Author)
AD-658 452 HC$3.00 MF$0.65

EXPLORATORY RESEARCH OF MAGNETIC MATERIALS BY ULTRASONIC TECHNIQUES.
Colorado Univ Boulder
For primary bibliographic entry see Field 20C.
AD-658 467 HC$3.00 MF$0.65

ELECTRON PARAMAGNETIC RESONANCE OF CERTAIN COLOR CENTERS IN ALKALI-HALIDE CRYSTALS,
Foreign Technology Div Wright-Patterson AFB Ohio
A. A. Bugai, M. A. Ruban, and A. A. Shatalov.
23 Jan 67, 13p Rept no. FTD-HT-66-424
TT-67-62915
Elektronnyi Paramagnitnyi Rezonans Nekotorykh Tsentrov Okraski v Shchelochnogaloidnykh Kristallakh, unedited rough draft trans. of mono. Fizika Shchelochnogaloidnykh Kristallov, n.p., 1962 p432-6.

Descriptors: (*Color centers, *Paramagnetic resonance), Alkali metal compounds, Halides, Potassium compounds, Chlorides, Hyperfine structure, Sodium chloride, USSR.
Identifiers: Potassium chloride.

KCl crystals with a concentration of 5.10 to the 16th power to 2.10 to the 17 power/cu. cm. F-centers were split in halves. The EPR of the original half, used as a standard, exhibited a strong signal with a signal-noise ratio of 100. In the second half the F-centers were destroyed by optical and thermal treatment, and F2 centers formed. EPR in these specimens was absent. Hyperfine structure of EPR lines of F-centers in KCl was observed at 20.4K. The average splitting was approx. 9, which was higher than the 7.72 observed by Feber. St 77K, the hyperfine structure dissappeared. The half-width of the lines at 77 and 20.4K was 58 and 60 oe respectively. Apparently, the EPR lines did not narrow in the range 300-20.4K. (Author)
AD-658 649 HC$3.00 MF$0.65

GROWTH OF EPITAXIAL GERMANIUM FILMS FROM SUPERCOOLED DROPS,
Foreign Technology Div Wright-Patterson AFB Ohio
N. N. Shefmal, and E. I. Givargizov. 28 Feb 67, 14p Rept no. FTD-HT-66-435
TT-67-62914
Rost Epitaksialnykh Cermanievykh Plenok za Schet Pereokhlazhdennykh Kapel. trans. of Rost Kristallov (USSR) v4 p15-21 1964.

Descriptors: (*Semiconducting films, *Epitaxial growth), (*Germanium, Semiconducting films), USSR, Supercooling, Drops, Crystallization, Melting point, Reduction (Chemistry), Germanium compounds, Chlorides.
Identifiers: Germanium chloride.

Crystallization of Ge from the gaseous phase formed by the reduction of GeCl4 with H, at (GeCl4): (H2) = 0.0013-0.004, was studied in the high-temp. region, >740C, on single-crystal plates of Ge oriented with (111), (110), and (100) faces. As the gas mixt. approached the plate, it attained a temp. sufficient to form a complex of several atoms. The complex grew rapidly by virtue of the autocatalytic effect of the Ge plate. This was supported by the fact that increasing the temp. of the plate from 740 to 790C increased the amt. of Ge deposited by plus or minus 10%. Reducing the rate of flow of the gas through the tube from 0.9 to 0.3 cm/sec., increased the size of the drop, i.e. the drop grew while still in the gaseous medium and not after it settled on the plate. The deposited film was shown to be a single-cryst. film. (Author)
AD-658 650 HC$3.00 MF$0.65

THE VAPORIZATION OF ZINC PHOSPHIDE,
Oberlin Coll Ohio Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-658 763 Not available from CFSTI.

MAGNETOPLASMA CYCLOTRON ABSORPTION IN PbSe,
Massachusetts Inst of Tech Lexington Lincoln Lab
Stuart Bermon. 19 Jan 67, 11p Rept no. JA-2978
ESD-TR-67-505
Contract AF 19 (628)-5167
Availability: Published in The Physical Review v158 n3 p723-32 Jun 15 1967.

Descriptors: (*Lead compounds, Cyclotron resonance phenomena), (*Semiconductors, Band theory of solids), Magnetic fields, Cryogenics, Electric fields, Carriers (Semiconduciors), Models (Simulations), Transport properties, Plasma medium, Anisotropy, Microwaves.

Measurements have been made of the derivative of the microwave surface absorption of p-type and n-type PbSe as a function of static magnetic field H at 70 GHz and 4.2 degrees K. H was parallel to the sample surface which was a (100) plane that

formed the central section of the bottom wall of a cylindrical cavity resonant in the TE113 mode. The microwave electric field E was set both parallel and perpendicular to H. Experimental curves obtained with H aligned along the (001) axis and the (011) axis, with the ordinary mode E parallel H and the extraordinary mode E perpendicular H of propagation excited independently, show good agreement with curves calculated for a high-density plasma under classical skin-effect conditions, with the assumption of an (111) ellipsoid of revolution model for the valence- and conduction-band extrema, and an appropriate isotropic relaxation time. The main structure in the curves is attributed to either hybrid or tilted-orbit resonances and to dielectric anomalies, but not to Azbel-Kaner resonance. The values deduced for the transverse effective mass mt and for the anisotropy, K = ml/mt, for the p-type specimen and for the n-type which had a carrier concentration of 1.1x10 to the 18th power cm, were mt = (0.0465 plus or minus 0.002)mo and K = 1.8 plus or minus 0.2, and for the n-type specimen (n = 2.9x10 to the 17th power cm) were mt = (0.041 plus or minus 0.002)mo and K = 1.67 plus or minus 0.2 specimen are given. Weak structure was also observed at low magnetic fields, which may be due to nonlocal effects such as subharmonic Azbel-Kaner resonance.
AD-658 770 Not available from CFSTI.

INVERSION OF CONDUCTION AND VALENCE BANDS IN Pb1-xSnxSe ALLOYS,
Massachusetts Inst of Tech Lexington Lincoln Lab
A. J. Strauss. 11 Jan 67. 5p Rept no. JA-2963A
ESD-TR-67-490
Contract AF 19 (628)-5167
Availability: Published in The Physical Review v157 n3 p608-11 May 15 1967.

Descriptors: (*Semiconducting films, Lead alloys), (*Lead alloys, *Band theory of solids), (*Tin alloys, Band theory of solids), (*Selenium alloys, Band theory of solids), Single crystals, Films, Optical analysis, Resistance (Electrical), Hall effect, Crystal structure, Lasers.
Identifiers: Lead stannoselenides.

Single-crystal films of Pb1-xSnxSe alloys with rocksalt structure (0 < or = x < or = 0.33) have been deposited by evaporation on cleaved (100) faces of KCl substrates. The energy gap Eg at T=300, 195, and 77K has been determined by measuring the optical transmission between 2 and 25 millimicrons. As x increases or T decreases, Eg decreases for sufficiently low values of x, but increases for x>0.2 and T=77K. The sign reversal in the composition and temperature dependence of Eg shows that the Pb1-xSnxSe alloys exhibit the inversion in band structure recently proposed for the Pb1-xSnxTe alloys. If Eg is assigned negative values for samples in which the conduction and valence bands are inverted from those in PbSe, the data are well represented by the equation Eg=0.13+ (0.00045/deg) T-0.89x eV. The inversion point, at which Eg=0 because the L6 (+) and L6 (-) band extrema are degenerate, is x=0.19 at 77K and x=0.30 at 300K. (Author)
AD-658 771 Not available from CFSTI.

MICROWAVE EMISSION FROM NONEQUILIBRIUM PLASMAS IN InSb SUBJECT TO MAGNETIC FIELDS,
Boeing Scientific Research Labs Seattle Wash Plasma Physics Lab
Betsy Ancker-Johnson. Jun 67. 71p Rept no. D1-82-0623

Descriptors: (*Indium antimonides, Plasma medium), (*Plasma medium, Microwaves), Magnetic fields, Oscillation, Electric fields, Stability, Experimental data.

The paper draws together a large amount of experimental information obtained by others as well as the author. Out of the maze of conflicting, at best, and contradictory, at worst, results, one set of consistent characteristics of the emission and its associated phenomena results. The reconciliation is obtained by means of a theory for the spatial distribution of plasmas during emission. It shows why some samples emit preferentially for B parallel to E, others for B perpendicular to E, and still others for intermediate orientation. The theory also clarifies the various observed threshold dependencies. The conflicting results concerning the spectral characteristics of the emission are attributed to faulty experimental techniques. Thus four characteristics of the emission and its associated phenomena are clearly described qualitatively, the spectrum, the polar dependencies, the sometimes attendant MHz resistance oscillations, and the threshold dependencies on E and B.
AD-658 772 HC$3.00 MF$0.65

NANOSECOND RISETIME, HIGH POWER, VARIABLE DELAY DOUBLE PULSER WITH APPLICATION TO ELECTRON-HOLE PLASMAS,
Boeing Scientific Research Labs Seattle Wash
For primary bibliographic entry see Field 14B.
AD-658 773 HC$3.00 MF$0.65

POLARON EFFECTS IN THE CYCLOTRON-RESONANCE ABSORPTION OF InSb,
Massachusetts Inst of Tech Lexington Lincoln Lab
D. H. Dickey, E. J. Johnson, and D. M. Larsen. 19 Jan 67. 5p Rept no. JA-2927
ESD-TR-67-302
Contract AF 19 (628)-5167
Availability: Published in Physical Review Letters v18 n15 p599-602 Apr 10 1967.

Descriptors: (*Indium antimonides, *Cyclotron resonance phenomena), Carriers (Semiconductors), Magnetic fields, Band theory of solids, Optical properties, Absorption.
Identifiers: Polarons, Reststrahlen.

Comparison of experimental results for cyclotron-resonance measurements above and below the Reststrahl frequency reveals anomalies attributable to polarons. (Author)
AD-658 789 Not available from CFSTI.

X-RAY DIFFRACTION STUDY OF ORDERING IN TWO SIGMA PHASES,
Illinois Univ Urbana
For primary bibliographic entry see Field 11F.
AD-658 794 Not available from CFSTI.

THEORETICAL ANALYSIS OF A SECONDARY EMISSION EXPERIMENT ON INSULATORS,
Parke Mathematical Labs Inc Carlisle Mass
For primary bibliographic entry see Field 20C.
AD-658 831 HC$3.00 MF$0.65

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5A.
AD-658 834 HC$3.00 MF$0.65

ELECTROREFLECTANCE STUDY OF INTERBAND MAGNETO-OPTICAL TRANSITIONS IN InAs AND InSb AT 1.5K.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
Carl R. Pidgeon, Steven H. Groves, and Julius Feinleib. 6 Sep 67. 11p Rept no. TN-1967-33
ESD-TR-67-493
Contract AF 19 (628)-5167

Descriptors: (*Indium alloys, *Magneto-optic effect), (*Arsenic alloys, Magneto-optic effect), (*Indium antimonides, Magneto-optic effect), (*Semiconductors, Magneto-optic effect), Reflection, Band theory of solids, Nuclear spins, Photons, Magnetic fields.
Identifiers: Indium arsenide.

The transparent electrode electroreflectance technique was used for interband magneto-optical studies of InAs and InSb at 1.5K. A report is given of the first direct experimental observation of the spin-orbit splitting, the effective mass, and the effective g-factor for the split-off band at k = 0 in InAs.
AD-658 835 HC$3.00 MF$0.65

PARAMAGNETIC IONS AND LATTICE VIBRATIONS.
Final rept. 17 Apr 63-31 Jul 66,
Johns Hopkins Univ Baltimore Md
John F. Porter, Jr. 1966. 4p
AROD-4194:7-P
Contract DA-31-124-ARO (D)-103

Descriptors: (*Paramagnetic materials, *Electron transitions), (*Phonons, Paramagnetic materials), Crystal lattices, Excitation, Vibration, Ions, Emissivity, Atomic energy levels.

A very brief summary is given of studies involving the non-radiative transitions form the excited states of ions in crystals and the role played by phonons in such transitions. Much of the work is reported in full detail in Appendix A, issued separately as AD-640 612; and in AD-623 977 and AD-627 348.
AD-658 895 HC$3.00 MF$0.65

SPONTANEOUS BAND MAGNETISM,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20C.
AD-658 905 Not available from CFSTI.

FIRST-ORDER LOCALIZED-ELECTRON = COLLECTIVE-ELECTRON TRANSITION IN LaCoO.
Journal article,
Massachusetts Inst of Tech Lexington Lincoln Lab
Paul M. Raccah, and John B. Goodenough. 1 Aug 66. 14p Rept no. JA-2872
ESD-TR-67-337
Contract AF 19 (628)-5167
Availability: Published in The Physical Review v155 n3 p932-43 Mar 15 1967.

Descriptors: (*Cobalt compounds, *Electron transitions), (*Lanthanum compounds, Electron transitions), Oxides, Crystal structure, Differential thermal analysis, Spin, X-ray diffraction analysis, Molecular orbitals, Band theory of solids, Excitons, Perovskites.
Identifiers: Lanthanum cobaltate, Cobaltates.

A description is given of studies on lanthanum cobaltate which resulted in the following conclusions: (1) crystal-field theory and band theory describe two different thermodynamic states of the electrons, and the entropy of the collective (band) electrons is larger so that a localized-electron = collective-electron transition is first order; (2) where low- and high-spin ions coexist, exciton transport is an important process; (3) electron mobility and, by inference, other physical properties that are independent of the existence of a Fermi surface vary continuously through a first-order localized-electron = collective-electron transition, provided the crystal symmetry is also continuous through the transition and the volume change is negligible.
AD-658 906 Not available from CFSTI.

QUANTUM KINETIC EQUATIONS FOR ELECTRONS IN RANDOM IMPURITIES,

Massachusetts Inst of Tech Lexington Lincoln Lab
Petron N. Argyres. 14 Sep 66, 34p Rept no. JA-2900
ESD-TR-67-339
Contract AF 19 (628)-5167
Prepared in cooperation with Harvard Univ., Cambridge, Mass.
Availability: Published in Annals of Physics v42 n3 p513-45 May 1967.

Descriptors: (*Crystal lattice defects, Interactions), (*Electrons, Interactions), (*Electrical conductance, *Quantum statistics), Kinetic theory, Distribution functions, Iterative methods, Field theory, Invariance, Electromagnetic fields, Scattering.
Identifiers: Gauge invariance.

The problem of the linear response of a collection of dynamically independent electrons interacting with a random set of scattering centers to an arbitrary electromagnetic field is considered on the basis of quantum kinetic equations. First a projection technique is used to derive a general kinetic equation for that part of the density matrix that is averaged over the uncorrelated impurity distribution. This procedure is free of the criticisms of the earlier methods of treating the impurity averaging and is at the same time much simpler. For the case of weak scattering, the importance of the interference term of the kinetic equation is demonstrated by studying the indirect power absorption. The case of uniform electric field is studied in detail for various simple systems, for which more specialized kinetic equations are derived simply as matrix elements of the general equation. For an arbitrary electromagnetic field the gauge invariance of the results is demonstrated by deriving a kinetic equation in terms of the physical field strengths rather than their potentials. A 'local' density matrix is introduced for the evaluation of the current density and its kinetic equation derived. From this a transport equation for a quantum-mechanical distribution function is obtained for the case of free electrons. The conditions under which it reduces to the Boltzmann equation for the classical distribution function are investigated. (Author)
AD-658 909 Not available from CFSTI.

A HALL FOUR-POINT PROBE ON THIN PLATES THEORY AND EXPERIMENT.
Revised ed.,
Stanford Univ Calif Stanford Electronics Labs
M. G. Buehler. 14 Mar 67, 15p
AROD-2895:21
Contract DA-31-124-ARO (D)-155
Revision of manuscript submitted 19 Jan 67.
Availability: Published in Solid-State Electronics v10 p801-12 1967.

Descriptors: (*Semiconductors, Probes), (*Probes, Hall effect), Measurement, Resistance (Electrical), Magnetic properties, Boundary value problems, Germanium, Indium alloys, Arsenic alloys, Sheets, Theory.

A method is described whereby the resistivity and Hall coefficient is determined using four point contacts placed on a Hall plate which is an isotropic, uniformly thick, two-dimensional sheet with a perpendicular magnetic field. A class of boundary-value problems is solved using a new method of images which shows that the Hall effect in specimens is produced by certain images with multi-valued potentials. Correction factors are evaluated for a square array of point contacts on five different Hall plates (infinite half-plate, infinite quarter-plate, circle, semicircle and quarter circle), and the solution to a rectangular plate is indicated. The theory is verified experimentally for three of these cases being uniformly doped InAs and Ge. (Author)
AD-658 913 Not available from CFSTI.

LOW-ENERGY INTERBAND TRANSITIONS AND BAND STRUCTURE IN NICKEL.
Journal article,
Massachusetts Inst of Tech Lexington Lincoln Lab
Jane G. Hanus, Julius Feinleib, and William J. Scouler. 22 May 67, 6p Rept no. JA-3052
ESD-TR-67-491
Contract AF 19 (628)-5167
Availability: Published in Physical Review Letters v19 n1 p16-20 Jul 3 1967.

Descriptors: (*Nickel, *Band theory of solids), Brillouin zones, Electron transitions.

Thermal modulation experiments in the low-energy region favor a reordering of the bands at the L point in the Brillouin zone in nickel. (Author)
AD-658 919 Not available from CFSTI.

PRESSURE EFFECTS ON THE ELECTRICAL PROPERTIES OF POLYCRYSTALLINE BORON.
Denver General Hospital Colo
For primary bibliographic entry see Field 7D.
AD-658 929 Not available from CFSTI.

CRYSTAL STRUCTURAL STUDIES ON SEMICONDUCTIVE MATERIALS.
Final progress rept. 1 Jan 63-30 Jun 67,
Pittsburgh Univ Pa
G. A. Jeffrey. 14 Sep 67, 9p
AROD-3975:7-P
Grants DA-ARO (D)-31-124-G412, DA-ARO (D)-31-124-G786

Descriptors: (*Semiconductors, Crystal structure), Aluminum compounds, Nitrides, Carbides, Germanium alloys, Selenium alloys, Mercury compounds, Iodides.
Identifiers: Germanium selenides, Mercuric iodides.

An investigation of the crystal structure of semiconducting materials is summarized. (Author)
AD-659 002 HC$3.00 MF$0.65

SOME LOCAL-MODE MEASUREMENTS OF Li-DIFFUSED, Te-DOPED GaAs,
University of Southern California Los Angeles
O. G. Lorimor, and W. G. Spitzer. 3 Jan 67, 4p
AFOSR-67-2215
Grant AF-AFOSR-496-67
Availability: Published in Journal of Applied Physics v38 n6 p2713-4 May 1967.

Descriptors: (*Gallium arsenides, Absorption spectrum), Lithium, Diffusion, Tellurium, Doping, Measurement, Impurities, Carriers (Semiconductors), Cryogenics.

It is the purpose of this note to report some experimental observation on the behavior of Li and Te impurities in GaAs. The method of study was by infrared absorption measurements of the Li localized vibrational modes in Li-diffused, Te-doped material. The present experiments are divided into three groups as follows: (A). Absorption-band strength vs (Te); (B). Li out-diffusion at temperatures T < or approximately 600C from Li-Te-doped samples; (C). effect of Li on annealing in samples with (Te) > or approximately 3x10 to the 18th power/cu cm. (Author)
AD-659 013 Not available from CFSTI.

LOCALIZED VIBRATIONAL MODES OF LITHIUM IN LITHIUM-DIFFUSED p-TYPE GaAs,
University of Southern California Los Angeles
O. G. Lorimor, and W. G. Spitzer. 3 Jan 67, 9p
AFOSR-67-2216
Grant AF-AFOSR-496-67
Availability: Published in Journal of Applied Physics v38 n7 p3008-14 Jun 1967.

Descriptors: (*Gallium arsenides, Absorption spectrum), Semiconductors, Doping, Lithium, Manganese, Cadmium, Zinc, Crystal lattices, Impurities, Diffusion, Carriers (Semiconductors), Cryogenics.

Samples of Mn-, Cd-, and Zn-doped GaAs were diffused to near compensation with Li. A number of Li-localized vibrational-mode absorption peaks have been observed. Three bands are present in Mn- and Cd-doped material. A simple model is proposed which is based upon interstitial Li paired with Mn or Cd, where the ion pairs are oriented along a (100) direction. In Zn-doped material four Li bands associated with Li-Zn complexes are observed. In this case the authors are unable to present a model consistent with existing experimental data. (Author)
AD-659 014 Not available from CFSTI.

EXACT SEMICLASSICAL THEORY FOR GALVANOMAGNETIC EFFECTS IN METALS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
G. Fair, and P. L. Taylor. Sep 67, 10p NASA-TN-D-4166
Contract 129-02-05-14-22
Sponsored in Part By Aec

Descriptors: *Boltzmann equation, *Electric conductivity, *Linear equation, *Magnetic field intensity, *Tensor field, Closed, Conductivity, Distribution, Effect, Electric, Equation, Exactness, Field, Form, Function, Galvanomagnetism, Intensity, Linear, Magnetic, Metal, Solution, Tensor.

For abstract, see STAR 05 21.
N67-35591 HC$3.00 MF$0.65

DEFECT PRODUCTION IN SINGLE CRYSTALS RESULTING FROM ION BOMBARDMENT SEMIANNUAL STATUS REPORT, 1 JAN. - 30 JUN. 1967.
Hiram Coll., Ohio. X-ray Physics Lab.
L. B. Shaffer. 31 Jul 67, 29p NASA-CR-88112, SASR-2
Contract NGR-36-019-001

Descriptors: *Cesium, *Scattering, *Single crystal, *X-ray equipment, Adsorption, Atom, Crystal, Damage, Detection, Diffractometer, Electronics, Equipment, Gas, Intensity, Measurement, Single, Theoretical, Vapor, X-ray.

For abstract, see STAR 05 21.
N67-35944 HC$3.00 MF$0.65

R.R.E. NEWSLETTER AND RESEARCH REVIEW.
Royal Radar Establishment, Malvern (England). Ministry of Technology.
For primary bibliographic entry see Field 17I.
For abstract, see STAR 05 21.
N67-36063 HC$3.00 MF$0.65

CONDUCTIVITY PHENOMENA IN POLYCRYSTALLINE ZINC OXIDE FILMS.
Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
M. L. Mc Daniel, R. R. Mitchell, and H. J. Watson. Jun 67, 28p NASA-CR-88107, R-237
Contract NAS8-20166

Descriptors: *Photoconductivity, *Polycrystal, *Thin film, *Zinc oxide, Coating, Conductivity, Control, Crystal, Electric, Film, Oxide, Physical, Property, Thermal, Thin, Zinc.

For abstract, see STAR 05 21.
N67-36087 HC$3.00 MF$0.65

APPLICATION OF THE AUGER PROCESS TO THE STUDY OF GASEOUS ADSORPTION ON TUNGSTEN.

Illinois Univ., Urbana. Dept. of Physics.
G. G. Tibbetts. Aug 67, 137p NASA-CR-88362, R-363
Grant NSG-376, Contract DA-28-043-AMC-00073/E/

Descriptors: *Adsorption, *Tungsten, Auger effect, Binding energy, Filament, Flash, Gas, Kinetics, Liquid nitrogen, Single crystal, Spectrometry.

For abstract, see STAR 05 21.
N67-36472 HC$3.00 MF$0.65

APPLICATION OF THE MOSSBAUER EFFECT IN DETERMINATION OF PHASE DIAGRAMS.
California Univ., Livermore. Lawrence Radiation Lab.
Ephraim Manasseh Howard. Jun 67, 86p
Contract W-7405-eng-48

Descriptors: (*Mossbauer effect, *Phase studies), (*Nickel alloys, *Gold alloys), X-ray diffraction analysis, Crystal structure.

For abstract, see NSA 21 19.
UCRL-50262 HC$3.00 MF$0.65

20M. Thermodynamics

A BOUNDARY-LAYER THEORY FOR CELLULAR CONVECTION.
Revised ed.,
Cornell Univ Ithaca N Y Graduate School of Aerospace Engineering
Donald L. Turcotte. 20 Dec 66, 12p
AFOSR-67-2167
Contract AF 49 (638)-1346
Revision of manuscript submitted 1 Sep 66.
Availability: Published in Int. J. Heat Mass. Transfer v10 p1065-74 1967.

Descriptors: (*Convection (Heat transfer), Fluid flow), (*Boundary layer, Convection (Heat transfer)), Theory, Prandtl number, Two-dimensional flow, Vortices.

A theory is developed for finite amplitude, steady cellular convection. The theory requires that the Prandtl number be large compared with unity and that the Rayleigh number be large compared with the critical Rayleigh number; only two-dimensional, laminar cells are considered. The core of each cell is an isothermal, highly viscous rotating flow. Thin thermal boundary layers are formed on the horizontal boundaries. When the thermal boundary layers from adjacent cells meet they separate from the horizontal boundary and form a thermal plume on the vertical boundary between cells. The body force in the plumes drives the viscous core flow. It is found that the Nusselt number for the total heat transfer between the horizontal boundaries is proportional to the Rayleigh number to the one-quarter power. Good agreement with experiment is obtained. (Author)
AD-658 525 Not available from CFSTI.

EXPERIMENTAL INVESTIGATION OF HEAT EXCHANGE OF FLAT PLATE IN SUPERSONIC RAREFIED GAS FLOW.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20D.
AD-659 023 HC$3.00 MF$0.65

THE SINGLE-ENGINE CLAUDE CYCLE AS A 4.2K REFRIGERATOR.
Technical note.,
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
R. C. Muhlenhaupt, and T. R. Strobridge. 1 Jun 67, 79p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.45.

Descriptors: (*Cryogenics, Refrigeration systems), (*Refrigeration systems, *Thermodynamic cycles), Performance (Engineering), Refrigerant compressors, Efficiency, Power, Mass transfer, Pressure, Optimization.
Identifiers: Claude cycle.

The performance of the 4.2K Claude-cycle refrigerator was computed taking into account the efficiencies of the various components. The results are presented in graphical form. These charts give the input power requirements, mass flow rates for both the compressor and expander, pertinent temperatures, and allow selection of the optimum high pressure for a given set of component characteristics. (Author)
NBS-TN-354 HC$0.45 MF$0.65

METHODS FOR OBTAINING SURFACE TEMPERATURES OF MATERIALS IN THE PRESENCE OF EXTRANEOUS RADIATION.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
B. L. Schilling. Sep 67, 29p NASA-TN-D-4107
Contract 124-08-03-13-23

Descriptors: *Ablating material, *Radiation pyrometer, *Surface temperature, Ablation, Brightness, Correction, Data, Filament, Gas, Glow, Hot, Material, Measurement, Optics, Pressure, Pyrometer, Radiation, Surface, Temperature, Variation, Wavelength.

For abstract, see STAR 05 21.
N67-35727 HC$3.00 MF$0.65

EFFECTS OF A SIMULATED SPACE ENVIRONMENT ON THERMAL RADIATION CHARACTERISTICS OF SELECTED BLACK COATINGS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 11C.
For abstract, see STAR 05 21.
N67-35729 HC$3.00 MF$0.65

A DIGITAL COMPUTER PROGRAM FOR CALCULATING STEADY TEMPERATURE AND DENSITY DISTRIBUTIONS IN A GAS CONTAINING HEAT SOURCES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 18K.
For abstract, see STAR 05 21.
N67-35762 HC$3.00 MF$0.65

ESTIMATES OF LOCAL AND AVERAGE FUEL TEMPERATURES IN A GASEOUS NUCLEAR ROCKET ENGINE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21F.
For abstract, see STAR 05 21.
N67-35764 HC$3.00 MF$0.65

THERMODYNAMIC PROPERTIES OF POTASSIUM TO 2100 DEG K.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
S. Heimel. Sep 67, 40p NASA-TN-D-4165
Contract 129-01-02-01-22

Descriptors: *Melting point, *Potassium, *Thermodynamic property, *Vapor phase, Computation, Data, Density, Energy, Enthalpy, Entropy, Gas, Melting, Phase, Point, Pressure, Property, Table, Thermodynamic, Vapor, Volume.

For abstract, see STAR 05 21.
N67-35776 HC$3.00 MF$0.65

HEAT TRANSFER IN 30 DEG AND 60 DEG HALF-ANGLE OF CONVERGENCE NOZZLES WITH VARIOUS DIAMETER UNCOOLED PIPE INLETS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
D. R. Boldman, H. E. Neumann, and J. F. Schmidt. Sep 67, 45p NASA-TN-D-4177
Contract 129-01-09-06-22

Descriptors: *Convergent nozzle, *Heat transfer, Boundary, Calculation, Coefficient, Convergence, Cooling, Distribution, Energy, Exchange, Exhaust, Heat, Inlet, Instrumentation, Layer, Nozzle, Pipe, Pressure, Rocket, System, Theory.

For abstract, see STAR 05 21.
N67-35937 HC$3.00 MF$0.65

SHOCK TUBE STUDY OF THE THERMAL CONDUCTIVITY OF ARGON.
Stanford Univ., Calif. Inst. for Plasma Research.
J. O. Bunting, and R. S. Devoto. Jul 67, 106p
NASA-CR-88360, SUDAAR-313
Contract NGR-05-020-091

Descriptors: *Argon, *High temperature research, *Thermal boundary layer, *Thermoconductivity, Analysis, Boundary, End, High temperature, Interferogram, Layer, Pressure, Refraction, Research, Shock, Thermal, Tube, Wall, Wave.

For abstract, see STAR 05 21.
N67-36419 HC$3.00 MF$0.65

DEVELOPMENT OF THERMAL TESTING TECHNIQUES AT HIGH SOLAR INTENSITIES FINAL REPORT, 13 AUG. 1965 - 13 MAY 1967.
Lockheed Missiles and Space Co., Palo Alto, Calif. Aerospace Sciences Lab.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 21.
N67-36489 HC$3.00 MF$0.65

STABILITY OF A HORIZONTAL FLUID LAYER WITH UNSTEADY HEATING FROM BELOW AND TIME-DEPENDENT BODY FORCE.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Arthur W. Goldstein. 8 Oct 58, 19p NASA-TR-R-4
AD-230 384

Descriptors: (*Fluids, Heating), (*Incompressible flow, Stability), Prandtl number, Perturbation theory, Boundary layer, Thermodynamics.

The stability of a horizontal layer of fluid heated unsteadily from below and subjected to a time-dependent body force field was investigated theoretically, assuming an incompressible fluid with small density changes resulting from heating. A stability criterion is developed and used to calculate critical Rayleigh numbers, which are found to be much higher than for the static case, dependent only on the shape of the density profile, and independent of heating rate and Prandtl number. The initial motion corresponds to approximately the same cell shape as for the static case. Velocity growth increases from zero at the critical time at a rate proportional to the Prandtl number. (Author)
PB-175 824 HC$3.00 MF$0.65

GRAPHICAL PRESENTATION OF DIFFERENCE SOLUTIONS FOR TRANSIENT RADIAL HEAT CONDUCTION IN HOLLOW CYLINDERS WITH HEAT TRANSFER AT THE INNER RADIUS AND FINITE SLABS WITH HEAT TRANSFER AT ONE BOUNDARY.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
James E. Hatch, Ralph L. Schacht, Lynn C. Al-

bers, and Paul G. Saper. 1960, 52p NASA-TR-R-56
AD-230 987, N62-70480

Descriptors: (*Thermal conductivity, *Cylindrical bodies), Heat transfer, Surfaces, Difference equations, Thermal insulation, Temperature, Materials, Cooling.

Nondimensional temperature distributions for transient radial heat conduction through hollow cylinders and one-dimensional heat conduction in slabs of finite thickness are presented in graphical form for a range of heat input. The solutions are for radial heat conduction with heat transfer at the inner radius or slab heat conduction with heat transfer at one boundary. In both types of conduction it is assumed that the boundary opposite the heat-transfer surface is thermally insulated. The radial solutions cover a range of dimensionless radius ratios. The material is assumed to be homogeneous, and the physical properties are considered invariant with temperature. (Author)
PB-175 851 HC$3.00 MF$0.65

APPROXIMATIONS FOR THE THERMODYNAMIC AND TRANSPORT PROPERTIES OF HIGH-TEMPERATURE AIR.
Technical rept.,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
C. Frederick Hansen. 1959, 38p NASA-TR-R-50

Descriptors: (*Air, High-temperature research), (*Thermal properties, Air), (*Transport properties, Air), Compressive properties, Enthalpy, Entropy, Specific heat, Acoustic properties, Viscosity, Thermal conductivity, Prandtl number, Heat transfer, Superaerodynamics, Dissociation.

The thermodynamic and transport properties of high-temperature air are found in closed form starting from approximate partition functions for the major components in air and neglecting all minor components. The compressibility, enthalpy, entropy, the specific heats, the speed of sound, the coefficients of viscosity and of thermal conductivity, and the Prandtl numbers for air are tabulated from 500 to 15,000 K over a range of pressure from 0.0001 to 100 atmospheres. The energy of air and the mol fractions of the major components of air can be found from the tabulated values for compressibility and enthalpy. It is predicted that the Prandtl number for fully ionized air, which is in complete equilibrium, will become small compared to unity, the order of 0.01, and this implies that boundary layers in such flow will be very transparent to heat flux. (Author)
PB-175 855 HC$3.00 MF$0.65

ALIGNMENT CHARTS FOR TRANSPORT PROPERTIES VISCOSITY, THERMAL CONDUCTIVITY, AND DIFFUSION COEFFICIENTS FOR NONPOLAR GASES AND GAS MIXTURES AT LOW DENSITY.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 7D.
PB-175 886 HC$3.00 MF$0.65

20N. Wave Propagation

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 9B.
AD-658 439 HC$3.00 MF$0.65

RESEARCH ON ELECTROMAGNETICS FOR PROJECT DEFENDER.
Professional Design Co Agawam Mass
For primary bibliographic entry see Field 20I.
AD-658 518 HC$3.00 MF$0.65

PROPAGATION OF ELF AND VLF WAVES BELOW AN ANISOTROPIC IONOSPHERE WITH A DIPPING STATIC MAGNETIC FIELD.
Research rept.,
Sylvania Electronic Systems-East Waltham Mass Applied Research Lab
Janis Galejs. Jul 67, 42p Rept no. RR-532

Descriptors: (*Ionospheric propagation, Extremely low frequency), (*Very low frequency, Ionospheric propagation), Attenuation, Sunspots, Velocity, Atmosphere models, Ionosphere, Electron density, Magnetic fields, Differential equations, Reflection, Exponential functions, Computer programs.

Fields of cylindrically curved ionosphere layers are approximated by exponential functions which consider the increase of the phase velocity and decrease of the attenuation rate with the altitude of the layers. Matrix multiplication techniques are applied to the treatment of multi-layer ionosphere models. The individual ionosphere layers are thin relative to the wavelength and the approximate field representations give in the limits of horizontal and radial static magnetic field results identical to those obtained using more accurate treatments of curvature effects. TM modes in the space between the earth and the ionosphere excite coupled TM and TE modes in the ionosphere layers, the presence of which are considered in an iterative solution of the modal equation. In the ELF range propagation parameters computed for the East to West (EW) and West to East (WE) directions differ most for dip angles of 15 to 30 degrees. In the VLF range propagation parameters may exhibit discontinuities for EW direction. The interference distance D of the two lower-wave guide modes is increased for propagation in the EW direction relative to propagation in WE direction provided that the electron density profiles exhibit sharp density gradients at heights in the range from 80 - 85 km. The desired propagation characteristics could not be produced in the presence of a nondipping static magnetic field or using smoothly varying electron density profiles. (Author)
AD-658 538 HC$3.00 MF$0.65

TRANSIENT NATURAL CONVECTION IN A VERTICAL TUBE WITH NON-AXISYMMETRIC WALL TEMPERATURE,
Fluid Thermal and Aerospace Sciences Case Inst of Tech Cleveland Ohio
For primary bibliographic entry see Field 20D.
AD-658 549 HC$3.00 MF$0.65

A HIGH SPEED DIGITAL RECORDER FOR ATMOSPHERIC NOISE (SFERIC) WAVEFORMS,
Naval Ordnance Lab Corona Calif
For primary bibliographic entry see Field 4A.
AD-658 722 HC$3.00 MF$0.65

RADIO SCIENCE.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 17B 4.
AD-658 751 Not available from CFSTI.

OBLIQUE INCIDENCE IONOSPHERIC REFLECTIONS OF 100 kHz PULSES.
Revised ed.,
Institute for Telecommunication Sciences and Aeronomy Boulder Colo
Robert H. Doherty. 3 Feb 67, 7p
Revision of manuscript received 22 Dec 66.
Availability: Published in Radio Science n6 p645-51 Jun 1967.

Descriptors: (*Ionospheric propagation, Low frequency), Electromagnetic wave reflections, Electromagnetic pulses, Measurement, Periodic variations.

The results of a 16-month study of the phase and amplitude variations of 100-kHz Loran-C pulse-signals between Attu and Sitkinak in the Aleutian Islands are presented. The data show changes in signal amplitude which occur at the same solar zenith angle throughout the year and phase changes which do not occur at the same solar zenith angle throughout the year. Signal amplitudes averaged 15 dB higher during the night than during the day. The shape of the measured diurnal phase and amplitude changes supports a two-layer formation of the lower ionosphere, the lower layer primarily influencing the signal amplitude, and the other primarily influencing the signal phase. The data suggest that an amplitude change occurs at a solar zenith angle of 100 degrees. This effect occurs while the sun's rays reaching the ionosphere are still penetrating the ozone layer.
AD-658 809 Not available from CFSTI.

PROPAGATION IN WAVEGUIDES FILLED WITH WARM PLASMA,
Case Inst of Tech Cleveland Ohio
For primary bibliographic entry see Field 9A.
AD-658 828 HC$3.00 MF$0.65

SHORT-PULSE SCATTERING BY A HEMISPHERE.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 17I.
AD-658 836 HC$3.00 MF$0.65

MICROWAVE BREAKDOWN OF THE REENTRY BOUNDARY LAYER.
Rept. for Jan 65-Dec 66,
Aerospace Corp El Segundo Calif Labs Div
W. P. Thompson, M. Epstein, and C. J. Lenander.
May 67, 30p Rept no. TR-1001 (2240-20)-11
SSD-TR-67-95
Contract AF 04 (695)-1001

Descriptors: (*Microwaves, Wave transmission), (*Atmosphere entry, Boundary layer), (*Antennas, Reentry vehicles), Electron density, Propagation, Failure (Electronics), Plasma medium, Simulation, Laminar flow.

Measurements of the microwave power required for breakdown were made in a simulated reentry boundary layer flow. By establishing a fully developed laminar pipe flow between cold walls, fed by a subsonic arc jet, a simulation was made of the appropriate boundary layer temperature, density, electron concentration, and chemical composition profiles over an altitude range from 80 to 180 kft. Correlation with existing theoretical models and comparison with recent hot-air breakdown measurements in shock tubes are made. The effects of chemical composition of hot air and of typical ablation products and quenchants upon breakdown are briefly explored. It is found that significant reduction in breakdown power occurs in hot air flows and that present theoretical models do not predict the high altitude breakdown power within a factor of three or more. (Author)
AD-658 851 HC$3.00 MF$0.65

RF-INDUCED PLASMA SHIELD PROPAGATION IN RARE GASES,
General Electric Co Philadelphia Pa Missile and Space Div
For primary bibliographic entry see Field 20I.
AD-658 868 HC$3.00 MF$0.65

A MODEL FOR PROPAGATION OF ELF AND VLF WAVES BELOW NATURALLY PERTURBED IONOSPHERES.
Research rept.,
Sylvania Electronic Systems-East Waltham Mass Applied Research Lab

J. Galejs, and M. Mentzoni. Sep 67, 34p Rept no. RR-536
Contract Nonr-3185 (00)

Descriptors: (*Ionospheric propagation, Ionospheric disturbances), (*Extremely low frequency, Ionospheric propagation), (*Very low frequency, Ionospheric propagation), Atmosphere models, Ionosphere, Attenuation, Phase, Velocity, Electron density, Numerical analysis.

A terrestrial propagation model is studied where the earth to ionosphere waveguide system is cylindrically stratified, the dip angle of the static magnetic field is assumed to be arbitrary and the waves propagate in East to West or West to East directions at a constant magnetic latitude. The profiles of ionospheric electronic density chosen for the numerical computations are representative of sudden ionospheric disturbances (SID), solar flares, auroral absorption or polar cap absorption (PCA) events. The resulting phase velocity and attenuation rates of ELF and VLF signals are compared with those computed under representative quiet daytime conditions. PCA events (which give the most dramatic effects) cause a lowering of the effective ionosphere: the resulting propagation is nearly isotropic and the phase velocities are decreased at ELF and increased at VLF. The attenuation rates are increased at ELF and also in the lower part of the VLF band. The propagation parameters are affected to a lesser degree by the other events: ionospheric density perturbations at heights below 60 km have more readily discernable effects at ELF, while the changes of the ionospheric density gradient at larger heights are observable at VLF. However, these differences are not uniquely distinguishab.e from propagation characteristics obtainable under quiet daytime conditions. (Author)
AD-658 881 HC$3.00 MF$0.65

LINEAR HIGH FREQUENCY ANTENNAS OVER A FINITELY CONDUCTING SPHERICAL EARTH.
Technical rept.,
Institutes for Environmental Research, Boulder, Colo.
Leslie A. Berry, and Mary E. Chrisman. Sep 66, 122p ITSA-8
IER-8

Descriptors: (*Antenna radiation patterns, *High frequency), Propagation, Diffraction, Spheres, Theory, Dipole antennas, Conductivity, Mathematical analysis, Partial differential equations.

Vertical radiation patterns of vertical quarter-wave monopoles, and of vertical and horizontal half-wave dipoles located at various heights up to twenty wavelengths over several typical types of ground are shown. Vertical antennas have the best low-angle patterns at low heights and at medium heights over land. For low and medium antenna heights, only vertically polarized antennas over water radiate appreciable energy at zero or negative elevation angles. The propagation factor used to calculate the antenna patterns can be accurately evaluated with the simple two-ray theory for elevation angles greater than one or two degrees. For smaller, and negative, elevation angles the full wave theory for diffraction by a sphere must be used. (Author)
AD-809 305 HC$3.00 MF$0.65

THEORETICAL AND EXPERIMENTAL STUDY OF A FINITE CYLINDRICAL ANTENNA IN A PLASMA COLUMN.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
B. R. Rao, W. A. Saxton, and C.-YU.Ting. Jul 67, 53p NASA-CR-88202, SR-1
Contract NGR-22-007-056

Descriptors: *Antenna, *Plasma cylinder, Cavity, Communication, Current, Cylinder, Density, Dipole, Distribution, Electron, Finite, Langmuir probe, Perturbation, Plasma, Radio, Sheath.

For abstract, see STAR 05 21.
N67-35956 HC$3.00 MF$0.65

ELECTROMAGNETIC SCATTERING FROM ABSORBING SPHERES.
Southwest Center for Advanced Studies, Dallas, Tex.
G. W. Kattawar, and G. N. Plass. 28 Dec 66, 46p
NASA-CR-88226, SR-1
Contract AF 19/628/-5039
Sponsored in Part By Nasa

Descriptors: *Absorption, *Electromagnetic scattering, *Refractive index, *Scattering cross section, *Sphere, Angular, Calculation, Cross section, Distribution, Electromagnetic, Extinction, Function, Index, Intensity, Mie theory, Particle, Refraction, Resonance, Scattering.

For abstract, see STAR 05 21.
N67-36604 HC$3.00 MF$0.65

21. PROPULSION AND FUELS

21B. Combustion and Ignition

EXPERIMENTAL AND ANALYTICAL STUDY OF THE H2-AIR REACTION KINETICS USING A STANDING-WAVE NORMAL SHOCK.
Final rept. Sep 65-Jun 67,
Arnold Engineering Development Center Arnold Air Force Station Tenn
Roger A. Strehlow, and Philip M. Rubins. Sep 67, 30p Rept no. AEDC-TR-67-177
Contract AF 40 (600)-1200
Presented at the AIAA Propulsion Joint Specialist Conference (3rd), Washington, D.C., 17-21 Jul 67, AIAA-Paper-67-479. Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Combustion, *Reaction kinetics), (*Hydrogen, Reaction kinetics), (*Air, Reaction kinetics), (*Shock waves, Reaction kinetics), Shock tubes, Chemical equilibrium, Pressure, Oscillation, Boundary layer, Heat transfer, Viscosity, Combustion chambers, Supersonic combustion ramjet engines.

An experimental method was devised whereby the macroscopic chemical reaction history can be traced from wall pressure measurements in a high speed reacting gas in a tube. The experiments were conducted with H2 and vitiated air, and the data were compared with calculated pressure profiles using recent reaction kinetic information obtained from shock tubes. Good agreement between experiment and calculation was found when the flow was steady and no oscillations were present, indicating that the kinetics which govern the chemical reactions in shock tube experiments can be reproduced with the standing-wave experiment. Wall effects are evaluated. In addition, a semi-empirical analysis was made of the ignition delay and recombination, with the assumption that the two-body reactions are essentially in equilibrium during the slower recombination period. The mathematics of this approach is simple and is potentially useful with machine computations involving chemistry and mixing, or chemistry and aerodynamics. Finally, a short experiment with methane combustion in the tube produced similar phenomena, indicating that the method may be useful for determining rates of heat release for gases where little is known of the kinetics. (Author)
AD-658 434 HC$3.00 MF$0.65

ISOTHERMAL DEGRADATION OF UNTREATED AND FIRE RETARDANT TREATED CELLULOSE AT 350C,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 7D.
AD-658 717 HC$3.00 MF$0.65

COMBUSTIBILITY TESTS ON SEVERAL FLAME-RESISTANT FABRICS IN COMPRESSED AIR, OXYGEN-ENRICHED AIR, AND PURE OXYGEN,
Union Carbide Corp Tonawanda N Y Linde Div
For primary bibliographic entry see Field 11E.
AD-658 953 Not available from CFSTI.

FORMATION OF CAVITIES AND MICROJETS IN LIQUIDS AND THEIR ROLE IN INITIATION AND GROWTH OF EXPLOSION.
Cambridge Univ (England) Cavendish Lab
For primary bibliographic entry see Field 19D.
AD-658 958 Not available from CFSTI.

GASEOUS-HYDROGEN LIQUID-OXYGEN ROCKET COMBUSTION AT SUPERCRITICAL CHAMBER PRESSURES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
M. Hersch, and E. J. Rice. Sep 67, 31p NASA-TN-D-4172
Contract 128-31-06-03-22

Descriptors: *Chamber pressure, *Liquid propellant, *Rocket combustor, Burn, Chamber, Combustion, Combustor, Hydrogen, Liquid, Nozzle, Oxygen, Pressure, Propellant, Rate, Rocket, Rocket engine.

For abstract, see STAR 05 21.
N67-35666 HC$3.00 MF$0.65

A PILOT PLANT STUDY OF LOW EXCESS AIR COMBUSTION - ITS EFFECT ON FIRESIDE PROBLEMS IN OIL-FIRED BOILERS.
Babcock and Wilcox Co., Alliance, Ohio. Research and Development Div.
For primary bibliographic entry see Field 13J.
PB-175 805 HC$3.00 MF$0.65

21C. Electric Propulsion

ELECTROTHERMAL MICROTHRUST SYSTEMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A. F. White. Aug 67, 10p NASA-TM-X-55897, X-734-67-387
Presented At Aiaa 3rd Propulsion Joint Specialist Conf., Washington, D. C., 17-21 Jul. 1967

Descriptors: *Electrothermal engine, *Microthrust, *Thrustor, Attitude, Control, Design, Development, Electrothermal, Engine, Jet, Performance, Power, Spacecraft, Station, System.

For abstract, see STAR 05 21.
N67-35525 HC$3.00 MF$0.65

HOT-WIRE CALORIMETRY: THEORY AND APPLICATION TO ION ROCKET RESEARCH.
Technical rept.,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Lionel V. Baldwin, and Virgil A. Sandborn. 13 Dec 60, 48p NASA-TR-R-98
AD-254 358, N62-70522

Descriptors: (*Ion engines, Calorimetry), (*Calorimeters, Probes), Ion beams, Test equipment, Theory, Cesium, Mercury.

A very small calorimeter probe (0.001 by 0.25 cm) for measuring local power density in high-energy ion beams has been studied both theoretically and experimentally. For high sensitivity, the wire is

heated by a detection current; the change in wire temperature due to ion impingement results in a voltage output. Both ion and joulean heat inputs are balanced by conduction along the wire to cooled supports. A steady-state calibration and error analysis is supported by experiment. Power-density measurements in 1- to 20-kilovolt cesium and mercury ion beams are presented as detailed spatial profile and contour maps. An analysis for the transient response of the hot-wire calorimeter was also verified by calibration experiments. (Author)
PB-175 905 HC$3.00 MF$0.65

DEMONSTRATION REPORT COVERING 1000 VOLT D.C. CHOPPER CONTROL SYSTEM WITH TYPE 1459 MOTORS AND 4160 VOLT - 3 PHASE - 60 CYCLES A.C. VARITRAN CONTROL SYSTEM WITH TYPE 1459-T TANDEM MOTOR UNITS.
Westinghouse Electric Corp., Pittsburgh, Pa. Transportation Div.
Feb 67, 101p
Contract Z-410
Prepared in cooperation with Department of Housing and Urban Development, Washington, D. C.

Descriptors: (*Railroads, *Electric propulsion), Electric motors, Control systems, Alternating current, Direct current, Feasibility studies, Braking, Power, Semiconductor devices, Electrical equipment.
Identifiers: Rapid transit systems.

A description is given of experience on the Bay Area Rapid Transit District test track with a 1000 volt D.C. line chopper and a varitran traction power package used with Type 1459 traction motors. The overall feasibility of the systems were demonstrated and areas for futher development were isolated.
PB-175 924 HC$3.00 MF$0.65

PERFORMANCE DEMONSTRATION OF THE ALTERNATING CURRENT PROPULSION SYSTEM.
Final rept. (Phase 5),
Allis (Louis) Co., Milwaukee, Wis.
D. R. Scholtes, T. Thomas, and R. C. Byloff.
1966, 91p
Contract 2-409
Prepared in cooperation with Department of Housing and Urban Development, Washington, D. C.

Descriptors: (*Railroads, *Electric propulsion), Electric motors, Alternating current, Performance (Engineering), Control systems, Acceleration, Braking, Power, Electrical equipment, Semiconductor devices, Feasibility studies.
Identifiers: Rapid transit systems.

The factory performance tests made on the propulsion system indicate that a propulsion system employing AC input power, solid state power control, and an AC motor can be designed and constructed to meet the requirements of rapid transit service. Most on-track conditions, including inertia, windage, power loss, and high temperatures were simulated and the required data was obtained. Since the system represents a major advance in the art of solid state technology, many problems were encountered during its development. These problems, including system stability, power loss capability, wide speed range, and tractive effort control were solved satisfactorily. (Author)
PB-175 936 HC$3.00 MF$0.65

A-C PROPULSION SYSTEM FOR BARTD RAIL CAR APPLICATION.
Final rept.
Garrett Corp., Los Angeles, Calif. AIResearch Mfg. Div.
May 67, 141p Rept. no. 66-0598
Contract Z-432
Prepared in cooperation with Department of Housing and Urban Development, Washington, D. C.

Descriptors: (*Railroads, *Electric propulsion), Electric motors, Alternating current, Performance (Engineering), Braking, Power, Electrical equipment, Semiconductor devices, Control systems, Feasibility studies.
Identifiers: Rapid transit systems.

The technical feasibility of a rapid rail car operating from a 3-phase, 4160-v, 60-Hz source and using alternating current traction motors and solid-state power conversion devices was successfully demonstrated. The system: Operated at speeds to 82 mph; accelerated and decelerated in excess of 2.8 mphps; demonstrated infinitely variable motoring and braking control; demonstrated regenerative braking by returning 25 percent of the energy to the supply for a 2.3 mile, 45-mph average speed run.
PB-175 961 HC$3.00 MF$0.65

21D. Fuels

FOREIGN SCIENCE BULLETIN, VOL. 3, NO. 7, 1967.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 9B.
AD-658 439 HC$3.00 MF$0.65

21E. Jet and Gas Turbine Engines

METHODS FOR PREDICTING THERMAL STRESS CRACKING IN TURBINE STATOR OR ROTOR BLADES SUMMARY REPORT.
Pratt and Whitney Aircraft, East Hartford, Conn.
O. L. Stewart, and W. H. Vogel. 10 Jul 67, 115p
NASA-CR-54636, PWA-3142
Contract NAS3-7909

Descriptors: *Crack, *Test stand, *Thermal stress, *Turbine blade, Acceleration, Alloy, Bending, Blade, Calculation, Cycling, Fatigue, Life, Moment, Prediction, Specimen, Stand, Strain, Stress, Synthesis, Temperature, Test, Thermal, Turbine.

For abstract, see STAR 05 21.
N67-35350 HC$3.00 MF$0.65

STALL PROPAGATION IN A CASCADE OF AIRFOILS.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 1A.
PB-175 862 HC$3.00 MF$0.65

21F. Nuclear Propulsion

ESTIMATES OF LOCAL AND AVERAGE FUEL TEMPERATURES IN A GASEOUS NUCLEAR ROCKET ENGINE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A. F. Kascak. Sep 67, 31p NASA-TN-D-4164
Contract 122-28-02-17-22

Descriptors: *Diffusion effect, *Nuclear fuel, *Radiative heat transfer, *Rocket engine, Analysis, Container, Diffusion, Effect, Engine, Flow, Fuel, Gaseous, Heat, Hydrogen, Nuclear, Pressure, Radiation, Rocket, Temperature, Thermodynamics, Thrust, Transfer.

For abstract, see STAR 05 21.
N67-35764 HC$3.00 MF$0.65

21H. Rocket Motors and Engines

SYSTEM EFFECTS ON PROPELLANT STORABILITY AND VEHICLE PERFORMANCE.
Quarterly rept. no. 1, 3 May-23 Jul 65.
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
Jul 65, 146p Rept. no. SM-47918
Contract AF 04 (611)-10750

Descriptors: (*Rocket motors (Liquid propellant), Performance (Engineering)), (*Space propulsion, Systems engineering), (*Liquid rocket propellants, Storage), Feasibility studies, Liquefied gases, Hydrogen, Fluorine, Theory, Feed pumps, Fuel injectors, Propellant control, Pressure, Venting, Pressurization, Models (Simulations), Mathematical models, Thermal insulation, Airframes, Design, Heat shields, Research program administration, Space simulation chambers.

The objective of the program is to study the influence of pertinent system design features and parameters on propellant storability and vehicle performance for a hypothetical LF2/LH2 maneuvering space propulsion system. The approach taken is to (1) perform theoretical studies on each basic sub-system and use the resulting data to optimize critical parameters for the overall system; (2) design and fabricate a test apparatus for evaluating as completely as possible, in a space simulation chamber, the analytical models used and the appropriate influence coefficients for inclusion into these models; (3) evolve a test plan for utilizing this test apparatus; and (4) use the test results to appropriately modify the analytical models and reoptimize the vehicle design parameters where necessary.
AD-467 569 HC$3.00 MF$0.65

CRITERIA FOR SELECTING SOLID ROCKET MOTORS AS TRACK TEST PROPULSION.
Air Force Missile Development Center Holloman AFB N Mex Directorate of Test Track
For primary bibliographic entry see Field 14B.
AD-658 841 HC$3.00 MF$0.65

GASEOUS-HYDROGEN LIQUID-OXYGEN ROCKET COMBUSTION AT SUPERCRITICAL CHAMBER PRESSURES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21B.
For abstract, see STAR 05 21.
N67-35666 HC$3.00 MF$0.65

EXPERIMENTAL HEAT-TRANSFER STUDY OF A REGENERATIVELY COOLED HYDROGEN-FLUORINE ROCKET ENGINE AT LOW CHAMBER PRESSURE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A. N. Curren, R. C. Krueger, F. L. Manning, and H. G. Price, Jr.. Sep 67, 68p NASA-TN-D-4178
Contract 128-31-06-01-22

Descriptors: *Heat-transfer coefficient, *Liquid propellant rocket engine, *Pressure drop, *Rocket chamber, Coefficient, Combustion, Cooling, Drop, Fluorine, Heat transfer, Hydrogen, Liquid, Nozzle, Pressure, Propellant, Regeneration, Rocket engine.

For abstract, see STAR 05 21.
N67-35667 HC$3.00 MF$0.65

PHOTOGRAPHIC INVESTIGATION OF LIQUID BEHAVIOR ON TEMPERATURE AND LIQUID-VAPOR SENSORS USED IN LOW-GRAVITY ENVIRONMENT.

National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. A. Berns, R. C. Nussle, and F. C. Yeh. Sep 67, 27p NASA-TM-X-1438
Contract 891-01-00-06-22

Descriptors: *Atlas centaur launch vehicle, *Flight test, *Flow meter, *Liquid-vapor interface, Coasting, Control, Drop, Flight, Flow, Fuel, Hydrogen, Interface, Launch, Liquid, Meter, Propellant, Sensor, Simulation, Tank, Test, Tip, Vapor, Vehicle.

For abstract, see STAR 05 21.
N67-35737 HC$3.00 MF$0.65

EXPERIMENTAL EVALUATION OF SIX ABLATIVE-MATERIAL THRUST CHAMBERS AS COMPONENTS OF STORABLE-PROPELLANT ROCKET ENGINES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A. M. Shinn, Jr., Jun 67, 43p NASA-TN-D-3945
Contract 128-31-03-01-22

Descriptors: *Ablating material, *Combustion chamber, *Liquid propellant rocket engine, *Storable propellant, Ablation, Chamber, Combustion, Erosion, Firing, Geometry, Liquid, Material, Nozzle, Propellant, Rocket engine, Test, Throat, Thrust.

For abstract, see STAR 05 21.
N67-35774 HC$3.00 MF$0.65

STERILIZABLE LIQUID PROPULSION SYSTEM QUARTERLY PROGRESS REPORT, 2 JAN. - 31 MAR. 1967.
Martin Co., Denver, Colo.
H. F. Brady, and C. Holt. Apr 67, 81p NASA-CR-88020, QPR-2
Contracts NAS7-100, JPL-951709
Prepared for Jpl

Descriptors: *Bipropellant, *Material testing, *Production engineering, *Propulsion system, *Sterilization, Alloy, Compatibility, Component, Design, Engineering, Ethylene, Liquid, Material, Metal, Oxide, Production, Propulsion, Rocket engine, Screening, System, Testing.

For abstract, see STAR 05 21.
N67-35988 HC$3.00 MF$0.65

21I. Rocket Propellants

SYSTEM EFFECTS ON PROPELLANT STORABILITY AND VEHICLE PERFORMANCE.
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
For primary bibliographic entry see Field 21H.
AD-467 569 HC$3.00 MF$0.65

AN INVESTIGATION OF THE EFFECT OF ACCELERATION ON THE BURNING RATE OF COMPOSITE PROPELLANTS,
Naval Postgraduate School Monterey Calif
James B. Anderson, and Roy E. Reichenbach. 28 Jul 67, 118p Rept no. NPS-57RV7071A

Descriptors: (*Composite propellants, Burning rate), Acceleration, Additives, Aluminum, Particle size, Flames, Diffusion, Solid rocket propellant binders.

The average burning rates of composite solid rocket propellant were measured in acceleration fields up to 2000 times the standard acceleration of gravity. The acceleration vector was perpendicular to and into the burning surface. Propellant strands were burned in a combustion bomb mounted on a centrifuge, and surge tanks were employed to ensure essentially constant pressure burning at 500, 1000, and 1500 psia. The burning rates of both aluminized and non-aluminized composite propellants were found to depend on acceleration. The effect of acceleration on burning rate was found to depend on the burning rate of the propellant without acceleration, aluminum mass loading, and aluminum mass median particle size. The relative burning rate increase was found to be greater for slow burning propellant than for faster burning propellants. The experimental results are compared to the analytical models proposed by Crowe for aluminized propellants and by Glick for non-aluminized propellants. The results indicate that these models do not adequately predict the observed relative burning rate increase with acceleration, and hence that more complex modeling will be required to explain the observed acceleration effect. (Author)
AD-659 029 HC$3.00 MF$0.65

22. SPACE TECHNOLOGY

22A. Astronautics

AN ASSESSMENT OF THE PRACTICALITY OF ORBITAL MAINTENANCE,
Air Force Aero Propulsion Lab Wright-Patterson AFB Ohio
Peter N. Van Schaik. 30 Aug 67, 23p Rept no. AFAPL-CONF-68-3
Presented at the AIAA Conference on Space Programs Issues of the 70's, Seattle, Wash., 28-30 Aug 67.

Descriptors: (*Space maintenance, Feasibility studies), Space stations, Manned spacecraft, Reliability, Redundant components, Systems engineering, Maintainability, Spare parts, Extravehicular activity, Cost effectiveness.

Spacecraft and space stations orbiting the earth for long periods of time will incur many malfunctions requiring redundancy or orbital maintenance. Redundancy will suffice for the shorter periods while maintenance becomes a necessity in the long run. For maintenance to become a reality it must be both system and cost effective. It will never become effective unless the spacecraft is maintainable, spares are interchangeable, and man can make in-space repairs. Current programs are slowly advancing the technologies but a concentrated, comprehensive program is needed to make maintenance a reality reasonably soon. (Author)
AD-658 454 HC$3.00 MF$0.65

FEASIBILITY STUDY FOR A HYDROGEN GAS LEAK DETECTION SYSTEM AS REQUIRED FOR USE ON INFLIGHT EXPERIMENTS FINAL REPORT, 1 JUL. 1966 - 25 JAN. 1967.
Raytheon Co., Sudbury, Mass. Space and Information Systems Div.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 21.
N67-35358 HC$3.00 MF$0.65

BIOMAGNETICS - CONSIDERATIONS RELEVANT TO MANNED SPACE FLIGHT.
Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
D. E. Busby. Sep 67, 63p NASA-CR-889
Contract NASR-115

Descriptors: *Astronaut performance, *Biomagnetics, *Magnetic effect, *Manned space flight, Astronaut, Bibliography, Effect, Exposure, Field, Health, Intensity, Magnetic, Manned, Performance, Protection, Radiation, Space flight.

For abstract, see STAR 05 21.
N67-35706 HC$3.00 MF$0.65

THE EFFECT OF PLANETARY ALBEDO ON SOLAR ORIENTATION OF SPACECRAFT.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A. Fontana. Sep 67, 27p NASA-TN-D-4133
Contract 125-19-03-09-23

Descriptors: *Albedo, *Solar sensor, *Space orientation, Analysis, Earth, Equation, Error, Mars (planet), Moon, Orientation, Output, Planetary, Sensor, Solar, Space, Spacecraft, Venus.

For abstract, see STAR 05 21.
N67-35722 HC$3.00 MF$0.65

EFFECTS OF A SIMULATED SPACE ENVIRONMENT ON THERMAL RADIATION CHARACTERISTICS OF SELECTED BLACK COATINGS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 11C.
For abstract, see STAR 05 21.
N67-35729 HC$3.00 MF$0.65

RESEARCH AND ADVANCED DEVELOPMENT. VOLUME I - SUPPORTING RESEARCH AND TECHNOLOGY FOR THE OFFICE OF SPACE SCIENCES AND APPLICATIONS, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION SEMIANNUAL REVIEW, 1 JUL. - 31 DEC. 1965.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
F. E. Goddard, Jr., 31 Jan 66, 402p NASA-CR-88088, JPL-TM-33-272, VOL. I
Contract NAS7-100

Descriptors: *Biotechnology, *Lunar exploration, *Magnetometer, *Space science, Astronomy, Exploration, Instrumentation, Ionosphere, Lunar, Photography, Planetary, Planetology, Science, Space.

For abstract, see STAR 05 21.
N67-35770 HC$3.00 MF$0.65

AUXILIARY POWER SYSTEMS FOR A LUNAR ROVING VEHICLE.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 10A.
For abstract, see STAR 05 21.
N67-35793 HC$3.00 MF$0.65

MINIMUM FUEL ASCENT FROM THE LUNAR SURFACE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A. E. Brown. Sep 67, 23p NASA-IN-D-4159
Contract 125-17-05-01-23

Descriptors: *Ascent trajectory, *Fuel economy, *Lunar launch, *Steepest descent method, Analysis, Ascent, Ballistics, Computation, Descent, Economy, Fuel, Launch, Lunar, Method, Minimum, Moon, Orbit, Phase, Separation, Steepness, Thrust, Trajectory.

For abstract, see STAR 05 21.
N67-35796 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-32, VOLUME IV FOR THE PERIOD FEBRUARY 1, 1965 TO MARCH 31, 1965. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 21.
N67-35972 HC$3.00 MF$0.65

RESEARCH AND ADVANCED DEVELOPMENT. VOLUME II - SUPPORTING RESEARCH AND

TECHNOLOGY FOR THE OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION SEMIANNUAL REVIEW, 1 JUL. - 31 DEC. 1965.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 21.
N67-36013 HC$3.00 MF$0.65

USE OF VARIABLE LIFT CONTROL TO OPTIMIZE AERODYNAMIC BRAKING FOR A MARS ENTRY VEHICLE.
California Univ., Los Angeles. Dept. of Engineering.
R. A. Niemann. Jul 67, 30p NASA-CR-88363, REPT.-67-34
Contract NAS7-100, Grant NSG-237-62
Prepared for Jpl

Descriptors: *Brake, *Lift distribution, *Mars spacecraft, *Variable lift, Aerodynamic, Atmosphere, Ballistics, Coefficient, Control, Distribution, Entry, Lift, Mars, Optimization, Reduction, Spacecraft, Terminal, Variable, Vehicle, Velocity.

For abstract, see STAR 05 21.
N67-36172 HC$3.00 MF$0.65

SECOND AEROSPACE MECHANISMS SYMPOSIUM.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
G. G. Herzl. 15 Aug 67, 197p NASA-CR-87990, JPL-TM-33-355
Contract NAS7-100
Proc. Held Aerospace Mech. Symp., Santa Clara, Calif., 4-5 May 1967

Descriptors: *Conference, *Mechanism, *Space environment, *Spacecraft component, Aerospace, Component, Deployment, Design, Environment, Lubrication, Lunar spacecraft, Performance, Release, Satellite, Simulator, Space, Spacecraft, Surveyor spacecraft, Test.

For abstract, see STAR 05 21.
N67-36203 HC$3.00 MF$0.65

SPACE PROGRAM.
California Univ., Los Angeles. Space Science Center.
W. F. Libby. Dec 66, 75p NASA-CR-88283
Grants NSG-216-62, NSG-249-62

Descriptors: *Astronomy, *Neurophysiology, *Planetary exploration, *Solar activity, *Space probe, Activity, Detection, Engineering, Exploration, Interplanetary, Particle, Planetary, Plasma, Probe, Satellite, Solar, Space, Spectroscopy, Structure.

For abstract, see STAR 05 21.
N67-36460 HC$3.00 MF$0.65

STUDY OF ASTRONAUT CAPABILITIES TO PERFORM EXTRAVEHICULAR MAINTENANCE AND ASSEMBLY FUNCTIONS IN WEIGHTLESS CONDITIONS.
Airesearch Mfg. Co., Los Angeles, Calif.
L. E. Browne, M. R. Gafvert, A. J. Macek, W. G. Robertson, and W. H. Shreck. Sep 67, 431p NASA-CR-859
Contract NAS1-5875

Descriptors: *Astronaut performance, *Extravehicular operation, *Human engineering, *Weightlessness simulation, Aid, Assembly, Astronaut, Bibliography, Capability, Device, Engineering, Human, Locomotion, Maintenance, Manual, Performance, Physiology, Restraint, Sequence, Simulation, Task, Tool, Underwater, Weightlessness, Work.

For abstract, see STAR 05 21.
N67-36491 HC$3.00 MF$0.65

LIFE IN EXTRATERRESTRIAL ENVIRONMENTS QUARTERLY STATUS REPORT, 31 MAY - 31 AUG. 1967.
IIT Research Inst., Annapolis, Md.
For primary bibliographic entry see Field 6F.
For abstract, see STAR 05 21.
N67-36580 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-27, VOLUME IV FOR THE PERIOD APRIL 1, 1964 TO MAY 31, 1964. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 21.
N67-36667 HC$3.00 MF$0.65

22B. Spacecraft

AN ANALYSIS OF LOW ORBITAL DRAG CONSTRAINTS OF ORBIT- AND SUN-ORIENTED SOLAR-CELL ARRAYS,
Air Force Aero Propulsion Lab Wright-Patterson AFB Ohio
Paul W. Lauderback. 17 Aug 67, 31p Rept no. AFAPL-CONF-68-2
Presented at the Intersociety Energy Conversion Engineering Conference (1967), Miami Beach, Fla., 13-17 Aug 67.

Descriptors: (*Solar panels, Aerodynamic characteristics), Drag, Orbital trajectories, Solar cells, Weight, Alignment.

A comparison of orbit- and sun-oriented solar-cell-array concepts to produce space power in low-earth orbits has been conducted. Results obtained show that aerodynamic drag penalties as large as 9100 pounds/kilowatt for a one-year mission may be encountered. The contribution of a drag makeup system to the total system specific weight for an orbit- or sun-oriented array is negligible above 250 and 375 nautical miles respectively. Below 185 nautical miles and for a mission duration of one year, the orbit-oriented array concept is more desirable from a weight standpoint. The study has included only the effects of aerodynamic drag. The drag makeup system consists of propulsive devices and storage tanks. For each concept the total system includes drag makeup, batteries, and solar-cell array. (Author)
AD-658 453 HC$3.00 MF$0.65

DETERMINATION OF THE DISTORTION AND THE FOCAL LENGTH FOR THE OBJECTIVE-LENS OF THE CAMERA NAFA-3c/25 AND A CAMERA WITH A MOVING FILM,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 14E.
AD-658 767 HC$3.00 MF$0.65

VAN ALLEN BELT SIMULATION.
Revised ed.,
Massachusetts Inst of Tech Lexington Lincoln Lab
Charles L. Mack. 3 Apr 67, 4p Rept no. JA-3003 ESD-TR-67-476
Contract AF 19 (628)-5167
Revision of manuscript submitted 9 Feb 67.
Availability: Published in Journal of Spacecraft and Rockets v4 n6 p819-21 Jun 1967.

Descriptors: (*Satellites (Artificial), *Shielding), (*Van Allen radiation belt, *Models (Simulations)), Semiconductors, Radiation damage, Degradation, Solar cells, Electrons, Ionization, Tests.

A radiation environment distributed in energy and angle-to-arrival was produced in order to study incidental satellite shielding and semiconductor damage effects. The incident electron flux was reduced two to four orders of magnitude by the solar cell and electronic structures before arriving at the normal location of electronic devices in the interior of an actual satellite. Semiconductor measurements showed that monoenergetic testing (at 1.5 Mev) produces ionization damage at a rate 1000 times higher than simulated trapped radiation and that it produces bulk damage at a rate 300 times higher. It is concluded that standard radiation-effects testing may be useful in selection of devices but is of little value in predicting device degradation versus electron fluence. (Author)
AD-658 780 Not available from CFSTI.

FACILITIES FOR SIMULATING ATTITUDE MOTION OF SPACECRAFT,
Redstone Scientific Information Center Redstone Arsenal Ala
For primary bibliographic entry see Field 14B.
AD-658 990 HC$3.00 MF$0.65

MANNED EXPEDITIONS TO MARS: A SELECTIVE BIBLIOGRAPHY,
TRW Systems Redondo Beach Calif
L. R. Magnolia. 18 Aug 67, 10p Rept no. 99900-6264-T001

Descriptors: (*Manned spacecraft, Bibliographies), (*Mars (Planet), Exploration).

Books, articles in periodicals, and conference papers are listed alphabetically by author.
AD-658 997 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF HIGH-PERFORMANCE AXIAL-FLOW TURBOMACHINERY. VOLUME I - DESIGN OF TURBINE COMPRESSOR.
Pratt and Whitney Aircraft, East Hartford, Conn.
For primary bibliographic entry see Field 10A.
For abstract, see STAR 05 21.
N67-35445 HC$3.00 MF$0.65

ELECTROTHERMAL MICROTHRUST SYSTEMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 21C.
For abstract, see STAR 05 21.
N67-35525 HC$3.00 MF$0.65

PLANETARY VEHICLE THERMAL INSULATION SYSTEMS, PHASE I SUMMARY REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 11D.
For abstract, see STAR 05 21.
N67-35552 HC$3.00 MF$0.65

ANALYSIS AND DESIGN OF SPACE VEHICLE FLIGHT CONTROL SYSTEMS. VOLUME XII - ATTITUDE CONTROL IN SPACE.
General Dynamics/Convair, San Diego, Calif.
A. L. Greensite. Aug 67, 166p NASA-CR-831, GD/C-DDE67-001
Contract NAS8-11454

Descriptors: *Control system, *Satellite attitude control, *Systems design, Actuator, Analysis, Attitude, Control, Coordinate, Design, Disturbance, Earth, Equation, Motion, Orbit, Reference, Satellite, System, Torque.

For abstract, see STAR 05 21.
N67-35557 HC$3.00 MF$0.65

ELECTROMAGNETIC GUIDANCE STUDY.
Mcdonnell Aircraft Corp., St. Louis, Mo.
J. H. Lowry. Sep 67, 421p NASA-CR-865
Contract NAS12-18

Descriptors: *Docking, *Electromagnetic instrument, *Guidance and control, Angle, Attitude, Continuous, Control, Electromagnetic, Guidance, Instrument, Line, Measurement, Nuclear, Optical, Pulse, Radar, Range, Rate, Sensor, Sight, Spacecraft, Technique, Wave.

For abstract, see STAR 05 21.
N67-35560 HC$3.00 MF$0.65

LUNAR ORBITER I. EXTENDED-MISSION SPACECRAFT SUBSYSTEM PERFORMANCE.
Boeing Co., Seattle, Wash.
Sep 67, 62p NASA-CR-870, D2-100727-5
Contract NAS1-3800

Descriptors: *Lunar orbiter, *Spacecraft performance, *Subsystem, Attitude, Communications, Control, Lunar, Mechanism, Orbital, Performance, Photography, Power, Reaction, Spacecraft, Structure, Test, Velocity.

For abstract, see STAR 05 21.
N67-35740 HC$3.00 MF$0.65

LUNAR FAR-SIDE COMMUNICATION SATELLITES.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
P. E. Schmid. 28 Jul 67, 31p TM-X-55886, X-507-67-328

Descriptors: *Communications satellite, *Lunar satellite, *Satellite tracking, Antenna, Apollo project, Capability, Communications, Data, Libration, Lunar, Orbit, Relay, Satellite, Telemetry, Tracking, Voice.

For abstract, see STAR 05 21.
N67-35865 HC$3.00 MF$0.65

THERMAL STUDY OF SATELLITE.
Etude Thermique Du Satellite
Societe pour L Etude Et La Realisation D Engins Balistiques, Courbevoie (France).
Dec 64, 23p DTA-50-4644, APPEND. IV
in French Prepared for Eldo

Descriptors: *Eldo satellite, *Solar cell, *Temperature control, Apogee, Cell, Control, Environment, Passive, Solar, Stage, Temperature, Thermal.

For abstract, see STAR 05 21.
N67-35931 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-32, VOLUME IV FOR THE PERIOD FEBRUARY 1, 1965 TO MARCH 31, 1965. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
30 Apr 65, 117p NASA-CR-88108, JPL-SPS-37-32, VOL. IV
Contract NAS7-100

Descriptors: *Engineering development, *Guidance and control, *Propulsion system, *Space exploration, *Space science, *Systems analysis, *Telecommunication, Analysis, Chemistry, Development, Engineering, Environment, Exploration, Facility, Fluid, Lunar, Physics, Planetary, Propulsion, Research, Science, Space, Spacecraft, System, Test.

For abstract, see STAR 05 21.
N67-35972 HC$3.00 MF$0.65

RESEARCH AND ADVANCED DEVELOPMENT. VOLUME II - SUPPORTING RESEARCH AND TECHNOLOGY FOR THE OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION SEMIANNUAL REVIEW, 1 JUL. - 31 DEC. 1965.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
F. E. Goddard, Jr., 31 Jan 66, 490p NASA-CR-88078, JPL-TM-33-272, VOL. II
Contract NAS7-100

Descriptors: *Chemical propulsion, *Communication system, *Electronics, *Human factor, *Nuclear-electric propulsion, *Space vehicle, Chemical, Communication, Electric, Engineering, Factor, Fluid, Human, Material, Mathematics, Nasa program, Nuclear, Physics, Propulsion, Research, Rocket, System.

For abstract, see STAR 05 21.
N67-36013 HC$3.00 MF$0.65

APPLICATIONS TECHNOLOGY SATELLITE GRAVITY GRADIENT STABILIZATION SYSTEM QUARTERLY PROGRESS REPORT, 1 FEB. - 30 APR. 1967.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
20 May 67, 139p NASA-CR-88130, DOC.-67SD4292
Contract NAS5-9042

Descriptors: *Applications technology satellite (ats), *Gravity gradient satellite, *Spacecraft performance, *Stabilization, Analysis, Attitude, Boom, Control, Damper, Flight, Gradient, Gravity, Ground, Manufacturing, Material, Performance, Quality, Satellite, Sensor, Spacecraft, Subsystem, Testing.

For abstract, see STAR 05 21.
N67-36032 HC$3.00 MF$0.65

OPTICAL IMAGERS FOR THE SMALL EARTH RESOURCES SATELLITE.
IIT Research Inst., Chicago, Ill. Astro Sciences Center.
For primary bibliographic entry see Field 20F.
For abstract, see STAR 05 21.
N67-36064 HC$3.00 MF$0.65

THERMAL PROTECTION SYSTEM FOR A CRYOGENIC SPACECRAFT PROPULSION MODULE, VOLUME II FINAL REPORT.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
J. W. Baxter, and W. H. Sterbentz. 15 Nov 66, 520p NASA-CR-54879, VOL. II.
LMSC-A794993, VOL. II
Contract NAS3-4199

Descriptors: *Cryogenic equipment, *Spacecraft design, *Thermal protection, Cryogenic, Design, Equipment, Insulation, Liquid, Lunar, Mission, Model, Module, Propellant, Propulsion, Protection, Spacecraft, Structural, Tank, Test, Thermal.

For abstract, see STAR 05 21.
N67-36077 HC$3.00 MF$0.65

DEVELOPMENT OF PHASE-CHANGE COATINGS FOR USE AS VARIABLE THERMAL CONTROL SURFACES FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
R. N. Griffin, and B. Linder. Sep 67, 59p NASA-CR-66394
Contract NAS1-5330

Descriptors: *Protective coating, *Spacecraft shielding, *Temperature control, *Thermal absorption, Absorption, Binder, Change, Coating, Control, Evaporation, Irradiation, Phase, Protection, Shielding, Spacecraft, Stability, Surface, Temperature, Thermal, Vacuum, Variable.

For abstract, see STAR 05 21.
N67-36080 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-29, VOLUME VI FOR THE PERIOD JULY 1, 1964 TO AUGUST 31, 1964. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
30 Sep 64, 67p NASA-CR-88105, JPL-SPS-37-29, VOL. VI
Contract NAS7-100

Descriptors: *Deep space network (dsn), *Ranger vii lunar probe, *Surveyor spacecraft, Engineering, Facility, Instrumentation, Interplanetary, Lunar, Network, Operation, Performance, Planetary, Probe, Space, Space flight, Spacecraft, Subsystem, System.

For abstract, see STAR 05 21.
N67-36100 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-26, VOLUME IV FOR THE PERIOD FEBRUARY 1, 1964 TO MARCH 31, 1964. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
30 Apr 64, 280p NASA-CR-88109, JPL-SPS-37-26, VOL. IV
Contract NAS7-100

Descriptors: *Communication system, *Guidance and control, *Propulsive efficiency, *Research project, *Space science, *Trajectory optimization, Aerodynamic, Characteristics, Chemistry, Communication, Control, Efficiency, Guidance, Optimization, Physics, Polymer, Project, Propellant, Propulsion, Research, Science, Space, Spacecraft, System, Trajectory, Tunnel, Wind.

For abstract, see STAR 05 21.
N67-36101 HC$3.00 MF$0.65

DEVELOPMENT OF THERMAL TESTING TECHNIQUES AT HIGH SOLAR INTENSITIES FINAL REPORT, 13 AUG. 1965 - 13 MAY 1967.
Lockheed Missiles and Space Co., Palo Alto, Calif. Aerospace Sciences Lab.
K. N. Marshall, and R. E. Rolling. Jun 67, 87p NASA-CR-73098
Contract NAS2-3164

Descriptors: *Environmental testing, *Solar simulation, *Spacecraft performance, *Temperature control, *Thermal protection, Analysis, Arc, Carbon, Computer, Control, Design, Environment, Filament, Lamp, Mathematics, Method, Model, Performance, Program, Protection, Simulation, Solar, Spacecraft, Surface, Temperature, Test, Testing, Thermal, Tungsten, Xenon.

For abstract, see STAR 05 21.
N67-36489 HC$3.00 MF$0.65

DYNAMIC MODEL INVESTIGATION OF WATER PRESSURES AND ACCELERATIONS ENCOUNTERED DURING LANDINGS OF THE APOLLO SPACECRAFT.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
S. M. Stubbs. Sep 67, 45p NASA-TN-D-3980
Contract 124-08-04-06-23

Descriptors: *Apollo spacecraft, *Dynamic property, *Impact test, *Simulation, *Spacecraft landing, Acceleration, Dynamic, Heat, Investigation, Landing, Model, Pressure, Property, Shield, Spacecraft, Surface, Water.

For abstract, see STAR 05 21.
N67-36564 HC$3.00 MF$0.65

MINIMUM-FUEL ATTITUDE CONTROL OF A RIGID BODY IN ORBIT BY AN EXTENDED METHOD OF STEEPEST-DESCENT.
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
I. Fluegge-lotz, and K. A. Hales. Jan 66, 145p
NASA-CR-79112, SUDAAR-257
Grant NSG-133-61

Descriptors: *Fuel control, *Satellite attitude control, *Steepest descent method, Acquisition, Attitude, Body, Control, Descent, Feedback, Fuel, High, Inertial, Low, Method, Minimum, Optimization, Orbit, Pontryagin principle, Rigid, Rotation, Satellite, Spacecraft, Steepness, Torque, Trajectory.

For abstract, see STAR 05 21.
N67-36602 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-27, VOLUME IV FOR THE PERIOD APRIL 1, 1964 TO MAY 31, 1964. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
30 Jun 64, 244p NASA-CR-88106, JPL-SPS-37-27, VOL. IV
Contract NAS7-100

Descriptors: *Communication system, *Guidance system, *Power supply, *Propellant, *Space exploration, *Space program, Communication, Exploration, Guidance, Power, Program, Space, Spacecraft, Supply, System.

For abstract, see STAR 05 21.
N67-36667 HC$3.00 MF$0.65

THE SYNOPTICS, DYNAMICS AND ENERGETICS OF THE TEMPORAL USING SATELLITE RADIATION DATA (IN ADDITION TO CONVENTIONAL OBSERVATIONS).
Saint Louis Univ., Mo. Dept. of Geophysics.
For primary bibliographic entry see Field 4B.
PB-175 996 HC$3.00 MF$0.65

STUDIES IN ATMOSPHERIC ENERGETICS BASED ON AEROSPACE PROBINGS.
Wisconsin Univ., Madison. Dept. of Meteorology.
For primary bibliographic entry see Field 4B.
PB-175 997 HC$3.00 MF$0.65

22C. Spacecraft Trajectories and Reentry

MICROWAVE BREAKDOWN OF THE REENTRY BOUNDARY LAYER.
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 20N.
AD-658 851 HC$3.00 MF$0.65

LABORATORY SIMULATION OF REENTRY PLASMA SHEATHS.
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 20I.
AD-658 882 HC$3.00 MF$0.65

MINIMUM-FUEL CONTROL OF SECOND-ORDER SYSTEMS WITH REAL POLES,
Massachusetts Inst of Tech Lexington Lincoln Lab
Michael Athanassiades. 16 Oct 62, 32p Rept no. MS-710
Research supported in part by U. S. Navy and U. S. Air Force.
Availability: Published in Unidentified journal.

Descriptors: (*Trajectories, Optimization), Fuel consumption, Control, Transfer functions, Boundary value problems, Time, Mathematical analysis.

It has been shown that for minimum-fuel operation of a second-order system, with arbitrary real poles, the phase plane must be divided into three sets; G sub -, G sub +, and G sub o. If the state point is in G sub -, then the fuel-optimal control is u (t) = -1; if the state point is in G sub +, then the fuel-optimal control is u (t) = +1; if the state point is in G sub o, then the fuel-optimal control is u (t) = 0. In order to derive the sets G sub -, G sub +, and G sub o it was necessary to use the iso-fuel curves and to determine individually the optimal control policies for different regions of the phase plane. In particular, it was necessary to find curves in the plane such that two control policies required the same fuel. Unfortunately, the equations of these curves cannot be solved explicitly, in general, and they must be solved separately for each particular system and for each terminal state. This is the reason that explicit equations for the boundaries of the sets G sub -, G sub +, and G sub o are not given. One can use similar techniques to determine the sets for terminal state which is reachable by the system. This would correspond to reaching all possible values of the output y sub 1 (t) and all possible values of the derivative of y sub 1 (t). Again one would find three sets in the phase plane. However, the boundaries of these sets will depend on the particular terminal state examined. (Author)
AD-658 998 Not available from CFSTI.

SPACE PROGRAMS SUMMARY NO. 37-30, VOLUME VI FOR THE PERIOD SEPTEMBER 1, 1964 TO OCTOBER 31, 1964. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
30 Nov 64, 36p NASA-CR-88087, JPL-SPS-37-30, VOL. VI
Contract NAS7-100

Descriptors: *Deep space instrumentation facility (dsif), *Mariner space probe, *Orbital calculation, *Ranger vii lunar probe, *Surveyor project, Analysis, Calculation, Deep, Dsif, Facility, Instrumentation, Lunar, Network, Operation, Orbital, Probe, Ranger project, Space, System, Thermal, Trajectory.

For abstract, see STAR 05 21.
N67-35546 HC$3.00 MF$0.65

AN EXPLICIT SOLUTION FOR THE LAGRANGE MULTIPLIERS ON THE SINGULAR SUBARC OF AN OPTIMAL TRAJECTORY.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
R. E. Burns. Sep 67, 36p NASA-TN-D-4119
Contract 933-50-01-00-62

Descriptors: *Lagrange multiplier, *Optimum thrust programming, *Problem solving, Algebra, Differential, Equation, Flow, Hamiltonian, Mass, Multiplier, Optimal, Partial, Problem, Programming, Solution, Steering, Thrust, Trajectory.

For abstract, see STAR 05 21.
N67-35668 HC$3.00 MF$0.65

STUDY OF ORBITAL GUIDANCE.
Etude Du Guidage Orbital
Societe pour L Etude Et La Realisation D Engins Balistiques, Courbevoie (France).
Dec 64, 20p DTA-50-4644, APPEND. V
in French Prepared for Eldo

Descriptors: *Eldo launch vehicle, *Polar orbit, *Velocity error, Apogee, Attitude, Control, Error, Guidance, Injection, Launch vehicle, Orbit, Polar, Satellite, Stage, Trajectory, Transfer, Velocity.

For abstract, see STAR 05 21.
N67-35739 HC$3.00 MF$0.65

MINIMUM FUEL ASCENT FROM THE LUNAR SURFACE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 21.
N67-35796 HC$3.00 MF$0.65

SPIN-UP SYSTEM. BOOST PHASE DISPERSIONS.
Mise en Rotation. Dispersion en Phase Propulsee
Societe pour L Etude Et La Realisation D Engins Balistiques, Courbevoie (France).
Dec 64, 68p DTA-50-4644, APPEND. I
in French Prepared for Eldo

Descriptors: *Eldo satellite, *Polar orbit, *Velocity error, Altitude, Apogee, Boost, Eldo launch vehicle, Engine, Error, Extinction, Orbit, Phase, Polar, Separation, Spin, Stabilization, Stage, Third, Transfer, Velocity.

For abstract, see STAR 05 21.
N67-35913 HC$3.00 MF$0.65

PRELIMINARY STUDY OF APOGEE STAGE OF EUROPA I LAUNCH VEHICLE.
Avant-projet D'estage D'apogee Du Lanceur Europa I
Societe pour L Etude Et La Realisation D Engins Balistiques, Courbevoie (France).
Dec 64, 96p DTA-50-4644
in French Prepared for Eldo

Descriptors: *Eldo launch vehicle, *European space program, *Spacecraft propulsion, Apogee, Control, Guidance, Injection, Orbit, Payload, Propulsion, Satellite, Separation, Spacecraft, Spin, Stabilization, Stage, Thermal.

For abstract, see STAR 05 21.
N67-35914 HC$3.00 MF$0.65

PRELIMINARY STUDY OF INERTIAL GUIDANCE LAWS.
Etude Preliminaire des Lois de Guidage Inertiel
Societe pour L Etude Et La Realisation D Engins Balistiques, Courbevoie (France).
Dec 64, 23p CDTA-50-4644, APPEND. III
in French Prepared for Eldo

Descriptors: *Eldo launch vehicle, *Inertial guidance, *Onboard navigation, *Satellite orbit, Attitude, Computer, Control, Equator, Guidance, Inertial, Law, Multistage, Navigation, Onboard, Orbit, Parking, Polar, Satellite, Trajectory.

For abstract, see STAR 05 21.
N67-35929 HC$3.00 MF$0.65

ROVING VEHICLE MOTION CONTROL QUARTERLY REPORT, 1 MAR. - 31 MAY 1967.
General Motors Corp., Santa Barbara, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Defense Research Labs.
T. M. Corry, D. E. Johnson, R. J. Johnston, J. E. Lingerfelt, and B. P. Miller. Jun 67, 75p NASA-CR-88285, TR67-34
Contracts NAS7-100, JPL-951829
Prepared for Jpl

Descriptors: *Remote control, *Roving, *Space vehicle, Astrodynamics, Astrophysics, Constraint, Control, Deep space network (dsn), Lunar, Mission, Motion, Planetary, Remote, Requirement, Subsystem, System, Technology.

For abstract, see STAR 05 21.
N67-36079 HC$3.00 MF$0.65

ORBITAL REGRESSION OF SYNCHRONOUS SATELLITES DUE TO THE COMBINED GRAVITATIONAL EFFECTS OF THE SUN, THE MOON AND THE OBLATE EARTH.
Rand Corp., Santa Monica, Calif.
R. H. Frick. Aug 67, 185p NASA-CR-88355, NASR-21/02/
Contract NASR-21

Descriptors: *Earth, *Gravitational effect, *Lunar gravitation, *Orbit perturbation, *Planetary gravitation, *Synchronous satellite, Control, Debris, Effect, Fuel, Gravitational, Lifetime, Lunar, Mass, Motion, Oblateness, Orbit, Payload, Perturbation, Planetary, Regression, Rotation, Satellite, Synchronous.

For abstract, see STAR 05 21.
N67-36636 HC$3.00 MF$0.65

CONTROL AND STABILIZATION OF SPACECRAFT. VOLUME III - ACTIVE CONTROL SYSTEMS.
European Space Research Organization, Paris (France).
Jan 67, 201p ESRO-SP-18
Proc. of the 4th Esro Summer School, Helsingor, Denmark, Aug.- Sep. 1966

Descriptors: *Attitude control, *Conference, *Control system, *Spacecraft control, *Stabilization, Attitude, Control, Dynamics, Gyro, Kinematics, Microthrust, Propulsion, Reaction, Sensor, Spacecraft, System, Wheel.

For abstract, see STAR 05 21.
N67-36669 HC$3.00 MF$0.65

AN APPROXIMATE ANALYTICAL METHOD FOR STUDYING ENTRY INTO PLANETARY ATMOSPHERES.
Technical rept.,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
Dean R. Chapman. 1959, 47p NASA-TR-R-11
AD-231 530

Descriptors: (*Atmosphere entry, Planetary atmospheres), (*Descent trajectories, Mathematical analysis), Venus (Planet), Earth (Planet), Mars (Planet), Jupiter (Planet), Equations of motion, Nonlinear differential equations, Drag, Aerodynamic heating.

The pair of motion equations for entry into a planetary atmosphere is reduced to a single, ordinary, nonlinear differential equation of second order by disregarding two relatively small terms and by introducing a certain mathematical transformation. A number of solutions for lifting and nonlifting vehicles entering at various initial angles have been obtained from the complete nonlinear equation. These solutions are used to study the deceleration, heating rate, and total heat absorbed for entry into Venus, Earth, Mars, and Jupiter. From the equations developed for heating rates, and from available information on human tolerance limits to acceleration stress, approximate conditions for minimizing the aerodynamic heating of a trimmed vehicle with constant lift-drag ratio are established for several types of manned entry. A brief study is included of the process of atmosphere braking for slowing a vehicle from near escape velocity to near satellite velocity.
PB-175 830 HC$3.00 MF$0.65

INVESTIGATION OF THE ABLATION OF SMALL PARTICLES UPON SIMULATED RE-ENTRY.
Final rept.,
TRW Systems, Redondo Beach, Calif.
J. C. Slattery, and E. Tagliaferri. Feb 67, 44p
Contract 48-2673

Descriptors: (*Auxiliary power plants, *Radioactive isotopes), (*Atmosphere entry, Ablation), Heat transfer coefficients, Particle size, Reactor safety systems.

For abstract, see NSA 21 19.
SC-CR-67-2583 HC$3.00 MF$0.65

22D. Spacecraft Launch Vehicles and Ground Support

CENTAUR AC-6 NOSE FAIRING SEPARATION TESTS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
C. W. Eastwood, Jr., and J. C. Humphrey. 1967, 120p NASA-TM-X-52290

Descriptors: *Centaur launch vehicle, *Fairing, *Flight test, *Nose, *Stage separation, *Surveyor spacecraft, Bulkhead, Centaur project, Component, Deflector, Device, Electric, Fair, Flight, Hardware, Impingement, Jettisoning, Launch, Load, Payload, Pressure, Pyrotechnics, Qualification, Reliability, Separation, Spacecraft, Stage, Structure, Support, Surveyor, System, Test, Thrust, Trajectory, Valve, Vehicle.

For abstract, see STAR 05 21.
N67-35375 HC$3.00 MF$0.65

RANGER LAUNCH VEHICLE INTEGRATION SUMMARY.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
W. J. Lane, and D. J. Stelma. 27 Jun 67, 272p
NASA-CR-88008, ED-333, REV.
Contract NAS7-100

Descriptors: *Atlas agena launch vehicle, *Chronology, *Ranger project, *Systems design, *Test program, Bibliography, Documentation, Integration, Interface, Mission, Requirement, Spacecraft, Specification.

For abstract, see STAR 05 21.
N67-35448 HC$3.00 MF$0.65

DEVELOPMENT OF GLASS PASSIVATION METHOD FOR SEMICONDUCTOR DEVICES FOR SATURN SYSTEM QUARTERLY PROGRESS REPORT, 28 JUN. - 28 SEP. 1966.
Philco Corp., Blue Bell, Pa. Microelectronics Div.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 05 21.
N67-35628 HC$3.00 MF$0.65

PHOTOGRAPHIC INVESTIGATION OF LIQUID BEHAVIOR ON TEMPERATURE AND LIQUID-VAPOR SENSORS USED IN LOW-GRAVITY ENVIRONMENT.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 05 21.
N67-35737 HC$3.00 MF$0.65

FAR-FIELD ACOUSTIC ENVIRONMENTAL PREDICTIONS FOR LAUNCH OF SATURN V AND A SATURN V MLV CONFIGURATION.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
S. Guest, and J. H. Jones. Sep 67, 35p NASA-TN-D-4117

Descriptors: *Noise measurement, *Rocket engine noise, *Saturn v launch vehicle, *Sound intensity, Effect, Environment, Intensity, Level, Measurement, Noise, Prediction, Pressure, Protection, Rocket engine, Sound, Spectrum, Trajectory.

For abstract, see STAR 05 21.
N67-35775 HC$3.00 MF$0.65

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